THE

Practical Teacher

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'Knowledge is proud that he has learned so much,
Wisdom is humble that he knows no more.'—COWPER.

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*On the Study of Hygiene in Elementary Schools.

BY

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IT may seem that the introduction of a subject like this is somewhat out of place in connection with a conference of medical officers of health; but I take it that health officers, as such, only exist to advance the interests of the public health, and that anything which will tend to increase the efficiency of their work is worthy of discussion and of serious consideration. Medical officers of health are ministers of health,-and there can be little doubt that the help that they may give in diffusing a knowledge of the laws of health will be more potent for the public good than all the Acts of Parliament bearing on the same subject.

Free institutions, like those of our own country, only work through the agency of public opinion. Laws which are in advance of and are not supported by public opinion, remain inert and incompetent. In the same way the enactments of the Public Health Act and other correlated Acts cannot be enforced unless with the cordial support of the local authority, the latter being a reflex of public opinion. It is evident then, that in order to ensure the permanent success of our work as medical officers of health the public must be educated; they must have a sound (if it be only an elementary) knowledge of hygiene.

If what I have said be admitted, it will be seen that to the list of duties of the medical officer of health given in the order of the Local Government Board must be added the duty of educating the local governing bodies and the general public in the laws of health. When we remember how short a time has elapsed since sanitation could claim to be founded on a scientific basis, this cannot be a matter of surprise, Much has been already accomplished, and the public has advanced greatly in its knowledge and appreciation of sanitary matters. Much more, however, remains to be done. If we take only the two questions of infection and of overcrowding, it will be obvious that a vast incubus of ignorance and indifference has still to be removed. The laws regulating the spread of infection are now thoroughly understood, so far as is required for practical purposes. It only remains to indoctrinate the public, and especially the mothers of families, with a knowledge of these laws. The days when infection was regarded as a mysterious visitation for which fasting and humiliation of spirit were the remedy, and not isolation of the infectious sick, are nearly gone; but yet every sanitary officer is daily encountering cases in which nothing but gross ignorance can account for culpable indifference to the spread of infection. On this point the public conscience as well as the public intelligence requires to be quickened, and it would be well if we could secure the co-operation of the clerical profession in preaching this doctrine.

The mortality statistics of various infectious diseases, stretching over a series of years, show that while scarlet fever is much less prevalent (so far as it can be tested by mortality returns) than formerly, whooping cough and measles show little if any improvement. The chief reason is not far to seek; scarlet fever is more feared by the general public than are whooping cough and measles. They do not understand that the latter diseases, directly or indirectly, cause many times the mortality of scarlet fever. Consequently children with scarlet fever are commonly kept isolated, either at home or in hospital, while for whooping cough and measles there is hardly a pretence at such isolation. We may hope that as the public become more educated in hygiene, whooping cough and measles will tend to decline in the same remarkable manner as scarlet fever has already done.

The evils of overcrowding again are very imperfectly understood, and the air of our houses is commonly vitiated and foul. Even in houses recently erected, the exit of foul air from rooms is not especially ensured; and the provision of fresh air is of the most

* A Paper read at a Conference of Medical Officers of Health in connection with the Congress of the Sanitary Institute at Brighton, August, 1890, by Dr. Newsholme, President of the Conference.

casual character. That foul air is one of the chief determining causes of phthisis, is a fact as yet almost entirely unknown to the general public, and one which needs to be constantly repeated at every opportunity. How many houses, erected within the last twelve months, have such a simple means of carrying off foul air from each room as is provided by having a small flue running alongside of but separate from the chimney-flue and communicating with the upper part of each room? Our houses go on being built with almost exactly the same complete neglect of ventilating arrangements as 50 years ago; and it would appear that the modern architect and builder are usually completely ignorant of the rudiments of sanitary science, or indifferent to the application of their knowledge.

It will be granted then, that it is necessary to educate the public. How can this best be effected? While not ignoring the importance of the work done by the Sanitary Institute in popularising the knowledge of Sanitary Science, and especially by means of such eloquent object lessons as are furnished by its annual exhibitions, I am convinced that our main hope for the future lies in the education of the children- Now, of the children, the major part are in attendance at elementary schools, Voluntary or Board. The age statistics of the census of 1881 show that 23·73 per cent. of the total population are between 3 and 13 years of age, at which ages attendance at elementary day-schools occurs. It is usually assumed that six-sevenths of the population are of the class whose children ought to attend public elementary schools, and it follows that 20 per cent. or one-fifth of the whole of the population might be found on the registers of these schools. After making due allowances for absences for sickness, distance from school, &c., it is calculated that school seats should be provided for one-sixth of the total population. At the present time there is school-provision for 5,440,441 scholars, which somewhat exceeds one-sixth of the total population.

Of these five and a-half million children for whom accommodation is provided in public elementary schools, only those in the senior standards could be systematically taught the science of health, but as the entire school population is expected to pass through these standards, it is obvious that we have here the means of training about six-sevenths of the entire population of the next generation.

By the teaching of hygiene is not meant instruction which will vainly attempt to make 'every man his own doctor;' such attempts are irrational, and whether made personally or in the columns of weekly or other newspapers, are most pernicious in their tendency and effect; but such instruction as is contained in the syllabus of the Science and Art Department in Hygiene, modified and adapted to meet the requirements of junior scholars. This teaching, in order to be successful and sound, must be based on an elementary knowledge of chemistry and physiology. But I think it would be a profound mistake to debar scholars from the study of hygiene until they have previously passed a somewhat severe examination in physiology. The amount of chemistry and physiology necessary to understand a really useful and practical course of lessons in hygiene can be incorporated in the lessons themselves. That this is so, is now sufficiently acknowledged by the Science and Art Department, who have removed the restriction previously in force, that no student shall be admitted to the hygiene examination unless he previously or at the same time passes the elementary examination in physiology of the Science Department. We all remember how in our student days anatomical facts which could receive applications in surgery or medicine were easily recollected, while facts which could not have such applications dovetailed with them escaped the recollection; and similarly the teacher who is master of his subject will be able to teach physiology in its hygienic aspects, and to make every point clear by chemical and other experiments, thus introducing his scholars to a useful and practical knowledge, having immediate and most potent bearings on the public health.

What subject is more important to be taught in our schools? We hear much, and not a word too much, about the advantages of teaching drawing, and of adapting a boy's training technically to the requirements of his future calling; but is it not of equal moment that both boys and girls should learn the rudiments of the science of health, and thus lay the foundations of an improved national health? Children who have been thus taught will not in the future continue to live in houses which cannot be described as homes, where light and air can scarcely find an entrance, where uncleanliness prevails, and the foundations of health and life are sapped by insanitary conditions. They are not likely to be careless as to the dangers of infection, or regardless of the evils of foul air or contaminated water, or damp houses. And thus our workhouses will cease to be crowded, the poor rates will diminish, the average of longevity and health and comfort will be raised, and the common weal will be enhanced. Surely a knowledge of the laws of health is as important as a knowledge of the elements of geometry; but at the present time the latter is taught; the former is severely ignored!

I am aware that hygiene for the last nine or ten years has been taught in connection with science classes throughout the country. But this teaching has hardly touched the fringe of the problem. Such teaching is voluntary; it is exceptional; it is as a rule given quite separately from elementary public schools. Hence the necessity for its extension, and for urging the establishment of hygiene as a compulsory subject in the senior classes of all day schools.

There is one difficulty in the way. Teachers are required who have been taught this subject. The majority of our present teachers are not competent for this work. You are aware that each teacher, as a rule, has had two years' training in a resident training college, and it is plain that if teachers are to teach this subject scientifically and successfully, the science of hygiene must form an integral part of their training. I find that in the present year there are 3,294 students resident in training colleges—1,408 males, and 1,886 females. Of this number 1,171 males and 1,230 female students were examined in some science subject at the Christmas examination, 1889.

The science subjects taken by each student were one or more of the following: Mathematics, Theoretical Mechanics, Sound, Light, and Heat, Magnetism and Electricity, Chemistry, Animal Physiology, Botany, Physiography, Agriculture. Hygiene is conspicuous by its absence, and only 286 students were examined in physiology (of whom nearly 20 per cent. failed to pass).

It is one of the rules of the Education Department that a previous success in one or more of a list of science subjects entitles candidates on their examination for admission to a training college to a certain addition to their marks, and helps to raise their relative position in the 'scholarship list.' The list of subjects is identical with that given above (only mathematics being omitted), and of the total candidates for admission to training colleges examined at Midsummer, 1889, as many as 1,412 received credit for previous success at the May examinations in science, out of a total of 9,872 examined. Here, again, hygiene is conspicuously absent, and it is noteworthy that, as shown by the official form which I hold in my hand, marks are only allowed to be counted for the above eight subjects, and that if a candidate were to pass in Hygiene, it would in no wise help his position. It is evident that this state of matters urgently calls for improvement.

We shall all agree that hygiene ought to be taught in our elementary day schools. But for this purpose it is necessary that teachers competent to teach the subject should be provided. Hence it must be arranged that candidates for admission for training colleges shall receive credit if they pass an examination in hygiene, and that in addition hygiene shall be made a compulsory subject of study in all the training colleges for teachers.

I venture, therefore, to submit the following resolution for your approval: 'That in the opinion of this conference of Medical Officers of Health, it is in the highest degree desirable that the study of Elementary Hygiene should be encouraged in schools, and that with this object in view (*a*) candidates for admission to training colleges should receive credit for having previously passed the science examination in Hygiene, and (*b*) Hygiene should be made an obligatory subject for study in training colleges; the scope of the study being at least as complete as that of the Hygiene examination of the Science and Art Department.'

I hope that this resolution may be endorsed not only by this Conference, but accepted by the general meeting of the Sanitary Institute, and that it may be found practicable to make a representation of our views to Sir W. Hart Dyke, as representing the Education Department, with the view of securing the practical adoption of our suggestions.

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Tests in Mental Arithmetic.

Standard I.

1. Multiply 7 by 3 and take away 6. 15.
2. How many more than a dozen is left? 3.
3. How many less than a score is left? 5.
4. How many are five nines and three? 48.
5. How many sixes can you take from that number? 8.
6. How many fours can you take? 12.
7. What would a dozen oranges cost at 3 for 2d.? 8d.
8. What would they cost at 4 for 3d.? 9d.
9. What would 3 dozen cost at that price? 2s. 3d.
10. How many days are there in 6 weeks? 42.
11. How many working days are there in 6 weeks? 36.
12. If a boy earns sixpence a day, how much will he earn in that time? 18s.

Standard II.

1. Take a dozen from two score. 28.
2. What is the half of that number? 14.
3. A boy had 30 marbles, and he lost a tenth of them. How many had he left? 27.
4. If he then lost a ninth, how many would he have had left? 24.
5. Take 1s. 7d. from half-a-crown. 11d.
6. How many oranges could you get for 11d. at 6d. a dozen? 22.
7. If 3 caps cost half-a-crown, what would one cost? 10d.
8. What would five cost? 4s. 2d.
9. What change would be received out of half-a-sovereign? 5s. 10d.
10. How many halfpennies could you get for that sum? 140.
11. Divide one-fifth of 140 by 7. 4.
12. If a man earns 8d. an hour, how much will he earn from 9 a.m. to 6 p.m.? 6s.

Standard III.

1. Add three florins, four half-crowns, and five sixpences. 18s. 6d.
2. Take 18s. 6d. from a guinea. 2s. 6d.
3. How many weeks will it take a boy to save that sum if he puts away 2d. weekly? 15.
4. How many less than a hundred is 7 times 9? 37.
5. What would 37 tops cost ar two a penny? 1s. 6½d.
6. What would 37 caps cost at 2s. each? £3 14s.
7. If a stone of soap cost 3s. 6d., what will a lb. cost? 3d.
8. What will 4½ lbs. cost? 1s. 1½d.
9. If 8 lbs. of rice cost 1s. 8d., what is that per lb.? 2½d.
10. If 3 quarts of milk cost a shilling, what is that per pint? 2d.
11. What would 2 gallons cost? 2s. 8d.
12. If half-a-pint is required for each person, how many could be supplied from that quantity? 32.

Standard IV.

1. How many inches are there in 3 yards? 108.
2. How many are there in 3½ yards? 126.
3. At a halfpenny an inch, what would 3½ yards cost? 5s. 3d.

4. How many lbs. are there in half-a-ton? 1,120.

5. What would half-a-ton of grapes cost at sixpence a lb.? £28.

6. How many ounces are there in half-a-stone? 112.

7. What would half-a-stone cost at a farthing an ounce? 2s. 4d.

8. If an iron cable cost £3 6s. a chain, what is that per yard? 3s.

9. What is it per mile? £264.

10. I owed £10, and offered to pay 4s. weekly; how long would it take to pay the debt? 50 weeks.

11. If I wish to pay it in 30 weeks, how much must I pay weekly? 6s. 8d.

12. If I was allowed 80 weeks to settle it, how much should I pay weekly? 2s. 6d.

STANDARD V.

1. John eats $\frac{1}{4}$ of an apple, and Harry eats $\frac{1}{6}$. How much do they both eat? $\frac{5}{12}$.

2. How much of the apple is left? $\frac{7}{12}$.

3. What is the quarter of $\frac{7}{12}$? $\frac{7}{48}$.

4. What is three times $\frac{7}{12}$? $1\frac{3}{4}$.

5. 15 horses can plough a field in 10 days; how long will it take 6 horses? 25 days.

6. How long would it take 20 horses? $7\frac{1}{2}$ days.

7. What part of a mile is 5 chains? $\frac{1}{16}$.

8. What part of a chain is $2\frac{1}{2}$ yards? $\frac{1}{8}$.

9. What decimal is equal to 3 times that fraction? ·375.

10. Multiply ·375 by 100. 37·5.

11. What is the amount of £675 for 3 years at 4 per cent.? £756.

12. What would be the amount in 4 months? £684.

STANDARDS VI. AND VII.

1. Express the sum of $\frac{3}{10}$ and $\frac{9}{50}$ as a decimal. ·48.

2. Express their difference decimally. ·12.

3. Divide ·48 by ·12. 4.

4. Divide ·12 by ·48. ·25.

5. What is the average of ·3 and ·6? ·45.

6. If the interest on a sum of money is £14 at 4 per cent., what will it be at 5 per cent.? £17 10s.

7. What will it be at $3\frac{1}{2}$ per cent.? £12 5s.

8. In what time will £275 amount to £341 at 4 per cent.? 6 years.

9. What is 7 per cent. of $7\frac{1}{2}$ tons? $10\frac{1}{2}$ cwt.

10. If an article, which cost £3, is sold at a loss of $12\frac{1}{2}$ per cent., what is the selling price? £2 12s. 6d.

11. If it had been sold for £2 12s. 6d. at a gain of $12\frac{1}{2}$ per cent., what would have been the cost price? £2 6s. 8d.

12. How much stock can be bought for £1,790 in the Three per Cents. at $89\frac{1}{2}$? £2,000.

Our Certificate Class.

BY DR. GEORGE BEACH, M.A.

Co-author of 'Our Mother Tongue,' &c., Head Master of Christ Church Schools, Macclesfield.

GENERAL REMARKS.

1. We repeat once more, in the hope that we may be just in time to benefit some of our readers, that *September 30th* is the last day for notifying to the Education Department the candidate's wish to sit for a certificate at Christmas.

2. On page 6 of Form IX. the words '*Christmas Examination*' should be written after the name of any 'Acting Teacher' who desires permission to sit at Christmas.

3. About this time we know to our cost that many intending candidates wake up from their lethargy, and begin to work in earnest. Hence come various inquiries as to 'cram-books,' 'short-cuts,' 'tips,' 'failing-subjects,' 'what propositions of Euclid may be missed?' etc.

To such questioners we would be cruelly kind, and urge them to forsake any idea of taking Second-year papers, but to attempt First-year ones only.

4. Teachers who pass in First-year papers may try Second-year at Chistmas, 1891.

5. The Query Column and the Certificate Model Answers in the September issue should be carefully studied.

6. After this month the Routines will be discontinued, as every part of the work has been mapped out, most of it several times over.

7. Special attention is called to the history of 'Privileges of Parliament,' which we insert by request. Both Scholarship Candidates and First-year Students would also do well to digest it.

8. Every Candidate should at once secure the new edition of Hellar's Code.

9. On page 309 of September issue, Sum 1, read £26 18s. 7·8d. for answer.

SPENCER ON EDUCATION.

(Pages 146 to end.)

After reading up to page 146 many utterances which stamp the mere theorist and display even considerable confusion of thought, it is extremely pleasant to proceed along the remainder of this work without meeting anything illogical, inexperienced or contradictory to far-sighted common sense.

As might therefore be expected the pages under consideration do not contain much that is original; but to compensate they forcibly present in conclusive detail many deductions universally agreed upon among educationists.

Asceticism—that vice of noble minds—is shown to be contrary to nature, and in innumerable ways injurious to the human constitution. In truth, our sensations, when not vitiated by excessive denial or indulgence are our safest guides, and they only lead us wrong when there has been *a searing of the corporeal conscience*.

Man should be considered as a composite being with a complex nature unstably balanced, so that any excess or defect inevitably disturbs the trembling equipoise.

Any disturbance of morals, any preponderance of mind, any excess of animal desires, troubles and injures the trinity of man's existence.

Therefore be not righteous over much, be not intellectual over much, be not corporeal over much, and thereby in the long-run greater vigour of the moral, mental and bodily faculties will ensue than could possibly be attained-to by an exclusive devotion to the cultivation of any one of these.

The hardening process which seeks unduly to develop the capacity for endurance, does so at the cost of loss of stature, loss of development, and loss of beauty. And this truth holds good also of the moral and mental nature.

Mr. Spencer gives several 'Time Tables' or Routines of Schools or Training Colleges. With his strictures upon the outrageous disproportion between hours of study and of recreation all must agree. Here, however, we can interpellate that much of the time appointed for study in our training colleges is only nominally so devoted.

Many of the lectures given are mere 'padding,' and varied are the diversions of 'private study.' We, for our part, have always contended, and in these pages strongly urged, that three hours of *bonâ fide* thorough mental exertion per day is as much as can be profitably utilised by the ordinary mind.

In our own elementary schools there is no 'keeping in,' no extension of hours as the inspector's visit looms large; but, on the contrary, half-holidays occur more and more as nearer and nearer draws the annual ordeal.

Very wise, too, are our author's deliverances against over-pressure in education, and prominently he brings forward the physical law, that there is always '*antagonism between growth and development.*'

In the course of nature growth precedes development, and any anticipation of the latter dwarfs the former. What becomes of precocious children?—nay, more, what becomes of our Senior Wranglers?

The highest and most perfect organisations are of slow and symmetrical growth, as a comparison between the oak and the cabbage will illustrate.

Many children that are dull at school, and especially during their short stay at elementary schools, surpass in later years their more advanced classmates, and often secure the prizes of life, partly because they missed those of school.

We cannot obtain from any individual more force than is inherent, however latent or undeveloped this may be, and any attempt to divert a large proportion of energy into a given channel is only successful by abstracting the due amount in another direction. Then, too, any disturbance of the balance of nature is accompanied by worry. Worry kills more than work, and who can describe the horrors of mental depression, except him who has suffered it? The racking headache, the dull lassitude, the doubts of God and man, the sleepless nights and the gloomy days, have led many to terminate a joyless and hopeless existence.

Elementary teachers, both on behalf of their scholars and themselves, should thank Heaven incessantly that 'payment by results'—falsely so called—is expiring. This system violated perhaps every principle of education, and especially those here insisted on by Mr. Spencer.

Girls have in the past certainly been greater victims than boys. Neither has their clothing been so warm, their liberty so unrestricted, nor their athletics so well attended to. Elegance and fashion in dress have been more valued than exercise, and a subdued lady-like manner been purchased at the expense of health.

At this point incidentally our author expresses his belief that the health of the middle and upper class is inferior to that of their forefathers, who, despite their excesses, lived longer and more vigorously. The fact itself is perhaps doubtful, but assuming its correctness, may we not inquire if the debility of the present generation is not partially owing to the intemperance of the past, as well as to the accelerated pace of modern life?

We rather regret to see the note respecting vaccination (p. 157), but rejoice to see at last (p. 169) a casual mention of '*Divine*' ordinations; and are glad to close our remarks upon this very unevenly-written and thought-out volume by giving two golden dicta of the writer's, viz.:—

(1) *All breaches of laws of health are physical sins.*

(2) *The aim of mental education is not to develop intellectual* FAT, *but intellectual* MUSCLE.

Paraphrasing.

1. (Lines 1—27, Scene 5, Act V., Richard II.)

My mind has been busy in noting the points of resemblance between my dungeon and the world. But it has failed in the attempt because, to start with, the earth has numerous inhabitants and this prison but one. Nevertheless I will try till I succeed.

To people this place my mind and spirit shall join, and together shall produce a crowd of prolific speculations, which shall inhabit myself, and be as variously and unrestfully disposed as actual human beings are.

My higher thoughts, viz., those of sacred matters, shall be mingled with doubts and be puzzled at contradictory passages of Scripture, such as those that invite, contrasted with those that show the apparent impossibility of accepting the proffered invitation. Thus are nobles mixed with those of lower rank, and are at variance one with another, ETC.

N.B.—This passage is so condensed that it will need in paraphrasing careful amplification.

2. (Lines 34—52, Scene 6, Act V., Richard II.)

Exton, I owe you no gratitude. With your murderous weapons you have done what will cause foul rumours to be circulated concerning well-esteemed England and me.

Why, sire, I performed it at your own instigation.

Though that may be so, yet those who are obliged to employ such as thee care for them no longer when they are no more of use.

Certainly I desired that Richard should die, but still I loathe his assassin and respect his memory.

I will give thee no reward, and show thee no countenance; let thy remorse pay thee for thy trouble, ETC.

3. (Lines 41—60, Scene 5, Act. V., Richard II.)

Hark! How out of time this music is! When rhythm is lost and no regularity preserved, the most melodious strain becomes disagreeable; and so it is as regards the harmony of man's existence.

As for music, I have the requisite faculty refined enough to detect any error in time; but as regards my own condition and career, I was too dull to notice any irregularity.

My ill-spent hours are now revenged upon me. I am become similar to a clock to mark the flight of time. My oscillations of thought are like those of a pendulum, my sighs are as ticks, the dial is represented by mine eyes, and the hands of the clock by my tear-wiping finger, ETC.

4. (Bacon's Essays, No. I., '*But it is not only the difficulty.....and daintily as candle-lights.*')

Three things incline men to indulgence in falsehood. *Firstly*, the obstacles encountered and the toils undergone before Truth can be discovered; *secondly*, the obligations with which the knowledge of Truth restrict a man; *thirdly*, and most powerfully, the innate but depraved liking of falsehood for its own sake.

One sect of Greek philosophers having investigated this propensity, were at a loss to understand why gratuitous deceit should be practised for the mere love of the thing, although they could understand the pleasure-bestowing imaginings of poetry and the profit-bringing misrepresentations of trade, ETC.

5. (Lines 1376—1392 of Lancelot and Elaine.)

Lancelot gave the king no reply, but betook himself to where a tiny stream flowed into the river, and there sat recessed, gazing down upon the wind-moved flags. Then with raised glance he beheld the barque, that had borne Elaine, gliding away in the distance—a mere speck upon the river; and he thought in his heart, 'O innocent and lovely maiden, your affection for me was more gentle and kindly than Guinevere's. I shall never forget to fulfil your request and to pray for your soul. Good-bye! thou art gone! Good-bye, sweet flower.'

ROUTINE FOR OCTOBER (MALES). *CONSIDERABLY ALTERED.*

DAY	FIRST WEEK			SECOND WEEK			THIRD WEEK			FOURTH WEEK		
MONDAY	**Algebra.** — Interest	**History.** — Dates 1714 to 1815. Revise Dynastic Tables	**School Management.** — Revision	**Algebra.** — Revision	**History.** — The Great Rebellion	**School Management.** — Draw up a course of 10 lessons for the 1st stage of any 'specific'	**Algebra.** — Binomial Theorem	**History.** — Wars between 1760 and 1815	**School Management.** — The bearing of 'Mental and Moral Philosophy' upon Education	**Algebra.** — Binomial Theorem	**History.** — Government Questions. (See Article)	**School Management.** — Disinfectants
TUESDAY	**Euclid.** — Any deductions on Book II.	**Maps.** — Shannon and Trent	**English.** — Paraphrase Lines 1—27, Scene 5, Act V., Richard II.	**Euclid.** — Revise Book IV.	**Maps.** — Tasmania and River Murray	**English.** — Paraphrase 'But it is not only the difficulty . . . . and daintily as candle-lights.' Bacon's Essays, No. I.	**Euclid.** — Revise first 17 Propositions of Book VI.	**Map.** — Coast of Indian Ocean	**English.** — Paraphrase Lines 1376—1392 Lancelot and Elaine	**Euclid.** — Revise Books III. or IV.	**Geography.** — Shape, size, and motions of the earth	**English.** — Paraphrase Lines 41—60, Scene 5, Act V., Richard II.
WEDNESDAY	**Arithmetic.** — Problems respecting walking, rowing, riding, etc.	**English.** — Write 20 lines of Composition on 'I may compare this prison..... .....world.' Lines 1 and 2, Scene 5, Act V., Richard II.	**Euclid.** — Revise Book III.	**Arithmetic.** — Miscellaneous	**English.** — Write 20 Lines of Composition on 'The advantages of Thrift.'	**Euclid.** — Any Deductions on Book IV.	**Arithmetic.** — Miscellaneous	**Algebra.** — Overtake any arrears of work	**Euclid.** — Any Deductions on Book VI.	**Arithmetic.** — Miscellaneous	**English.** — Richard II. to end of scene 6, Act V.	**Euclid.** — Revise Book VI. to end of Prop. 17
THURSDAY	**School Management.** — Reasoning (Revision)	**Geography.** — Our African Possessions	**English.** — Richard II. to end of Scene 1, Act IV.	**School Management.** — Revise Spencer on Education	**Geography.** — Our possessions in Oceania	**English.** — Lines 700—958 of Lancelot and Elaine	**School Management.** — Notes of a lesson on Freehand Drawing	**Geography.** — Our possessions in Europe	**English.** — Richard II. to end of Scene 2, Act V.	**School Management.** — Revise Spencer on Education	**Music.** — Accent, Syncopation, Transcription from one *time* to another	**English.** — Lines 958—1189 of Lancelot and Elaine
FRIDAY	**Algebra.** — Annuities	**History.** — Reign of Edward VI.	**Writing.** — 1. Dictation. 2. Copy book. 3. Words or passage previously set.	**Algebra.** — Binomial Theorem	**History.** — Reign of Mary	**Arithmetic.** — Miscellaneous	**Algebra.** — Permutations and Combinations	**History.** — Reign of Elizabeth	**Geography.** — Australia or India	**English.** — Write 20 lines of Composition upon 'The Puritans'	**Music.** — Terms in common use relating to expression, pace, and style	**English.** — Bacon's Essays, 32, 36, 38, 39, and 50
SATURDAY	**Euclid.** — Any Deductions on Book III.	**English.** — Revise Bacon	**School Management.** — Government Questions (see article)	**Geography.** — The atmosphere, Rain, Clouds, Vapour, Snow, Hail	**Euclid.** — All Axioms, Definitions, etc.	**Examination.** — Geography (see Article)	**School Management.** — 'Form VIII. M.' Examination, Duplicate, and Exemption Schedules	**Euclid.** — Revise Books I. or II.	**English.** — Bacon's Essays, 27—31	**Geography.** — Revision	**Algebra.** — Binomial Theorem	**History.** — Reign of Elizabeth	**Examination.** — School Management (See Article)	**English.** — Lines 1189 to end of Lancelot and Elaine

ROUTINE FOR OCTOBER (FEMALES). *CONSIDERABLY ALTERED.*

DAY	FIRST WEEK			SECOND WEEK			THIRD WEEK			FOURTH WEEK		
MONDAY	Arithmetic. — Square Root	History. — Dates 1674 to 1685. Curtis' Date Book	School Management. — Revision	Arithmetic. — Fractions	History (1685—88) — Dispensing and Suspending Powers of King. Trial of Bishops. Standing Army. Convention Parliament	School Management. — Draw up a course of 10 Lessons for the First Stage of a 'Specific'	Arithmetic — Insurance	History. — Rebellion of Monmouth and Argyle. The Bloody Assize	School Management. — The bearing of 'Mental & Moral Philosophy' upon Education	Arithmetic. — Partnership	History. — (1685—1688) Distribution of Population. Revocation of Edict of Nantes (Revision)	School Management. — Disinfectants
TUESDAY	Domestic Economy. — What parts of our food tend respectively to produce Warmth, Fat, Muscle, Size of Bone, and Strength?	Geography. — Map of Australia	English. — Paraphrase Lines 1—27, Scene 5, Act V., Richard II.	Domestic Economy. — What are the uses of Lime Juice, Camomile, Cod Liver Oil, Camphor, and Ipecacuanha?	Geography. — Maps of Murray and Ganges	English. — Paraphrase Lines 34—52, Scene 6, Act V., Richard II.	Domestic Economy. — Give a list of all articles needed to keep a dwelling-house clean, stating prices	Geography. — Maps of minor Colonies	English. — Analyse and Parse difficult words of lines 1—12, Scene 3, Act V., Richard II.	Domestic Economy. — What should be done in cases of catching fire 1. One's self? 2. Another person 3. A house?	Geography — West Indies	English. — Paraphrase Lines 41—62, Scene 5, Act V., Richard II.
WEDNESDAY	Arithmetic. — Government Questions	English. — Write 20 Lines of Composition on Lines 1 and 2, Scene 5, Act V., Richard II.	Sewing, etc. — Practise needlework diagrams	Arithmetic. — Compound Proportion	English. — Write 20 Lines of Composition on 'The Advantages of Thrift'	Sewing, etc. — Practise 'Plain' Sewing	Arithmetic — Stocks	Sewing, etc. — Cut-out a Woman's Night-dress	Domestic Economy. — What are the symptoms of Measles, Mumps, Scarlatina, Chicken-pox and Hooping-Cough?	Arithmetic. — Areas	Sewing, etc. — Cut-out a Boy's Shirt	Domestic Economy. — Revise 'Investments'
THURSDAY	School Management. — Reasoning (Revision)	Geography. — Hindostan	English. — Richard II. Notes on the Language of the Play	School Management. — Revise Spencer on Education	Geography. — Australia	English. — Analyse and Parse difficult words of lines 83—94, Scene 5, Act V., Richard II.	School Management. — Notes of a Lesson on 'The Alphabet'	Geography. — New Zealand	English. — Notes and Text of Richard II. to end of Scene 4, Act V.	Music. — Accent, Syncopation, Transcription from one *time* to another	School Management. — Revise Spencer on Education.	English. — Notes and text of Richard II. to end of Scene 6, Act V.
FRIDAY	Arithmetic. — Government Questions (See previous Articles)	History. — Literature, etc., Revise	Writing. — 1. Dictation. 2. Copy Book. 3. Copy previously set	Arithmetic. — Interest	History. — Declaration of Rights 'Non-Resistance' Moral Degeneracy after Restoration (Revision)	Sewing, etc. — Any Needlework	Arithmetic. — Discount	Sewing, etc. — Any Arrears	Any backward work	Music. — Terms in common use relating to Expression, Pace and Style	History. — Dates 1685 to 1689 Curtis' Date Book	Sewing, etc. — Cut-out a Child's Muslin Pinafore
SATURDAY	Domestic Economy. — Describe fully 'Bread Making.' What chemical changes take place?	English. — Trench, Lecture I.	School Management. — Government Questions (See Article)	Geography — British North America	Sewing, etc. — Any Cutting-out	Examination. — Geography (See Article)	School Management. — 'Form VIII. M.' Examination Duplicate, Exemption and Half-Time Schedules	Domestic Economy. — Explain the qualities and use of Borax, Soda, Ox Gall, Chloride of Lime, and Paraffin	English. — Trench, Lecture II.	Geography — South Africa	Sewing, etc. — Practise 'Plain' Sewing	History, Literature, etc. — Davies, pp. 151 to 157 (see Article)
											Examination. — School Management (See Article)	English. — Trench, Lecture III.

PARSING.

1. (Lines 1—12, Scene 3, Act V., Richard II.)

No, tell, full, months, since, if, 'tis, would, there, for, such, as, stand, which, boy, takes, support.

2. (Lines 83—94, Scene 5, Act V., Richard II.)

Proud, eat, proud, clapping, would, since, break, that, that, forgiveness, horse, why, created, to be awed, horse, yet, like, ass, tired.

3. (Lines 1—14, Scene 1, Act I., Richard II.)

Lancaster, hither, son, good, appeal, let, hear, have, liege, tell, moreover, if, duke, worthily, as, should, as, near, as, no, malice.

4. (Lines 37—47, Scene 1, Act V., Richard II.)

Sometime, hence, think, that, even, as, leave, sit, tell thee, betide, ere, thou, weeping, for, why, accent.

STORY OF LANCELOT AND ELAINE—(*continued*).

(Lines 1,130 to 1,418.)

The next day Elaine's two brothers carried out her dying wish, bore her to the barge and, weeping, wished her mute form a long farewell. Then the dumb old servitor rowed her up stream. Surpassingly beautiful was she, and life-like, not as dead.

That very day Lancelot sought the queen to give to her the completed tale of diamonds, and he requested her acceptance of them with many courtly and loving phrases.

But jealousy of Elaine had maddened her, and after uttering much biting sarcasm, she hurled the diamonds through the open casement into the stream beneath.

Then while Lancelot leant, in half disdain of all things, upon the window ledge, close underneath his eyes and right across the sunken diamonds passed the barge whereon Elaine lay as if smiling.

The queen had not seen this, but burst away to grieve apart, whilst all the court wondered at the barge and talked of enchantment.

Now the king passed by and bade Elaine be carried into the hall, and this done he took her letter and read it. It declared her death for love of Lancelot, took a tender farewell of him, and asked his prayers for her soul.

This caused Lancelot to explain matters with a noble simplicity and feeling, and Arthur decreed her a stately funeral. So was the maiden buried, not meanly as one unknown, but with gorgeous obsequies and mass and rolling music, like a queen; and Guinevere's jealousy being so tragically entombed, she begged and obtained Lancelot's forgiveness.

Then the king so spake to Lancelot of his trust in, and honour of, him; of his solitary homeless state, and his own desire to see him nobly wedded, that the knight retired apart to where a little brook flowed into the river.

There he saw the departing barge vanishing, and bade Elaine farewell.

Thinking next of the queen's behaviour and of Arthur's betrayed confidence, he was seized with anguish and groaned in remorseful pain, not knowing he should die a holy man.

HISTORY.

Females.

(Davies, pp. 151 to 157.)

Omit Filmer, Harrington, Gale, Wilkins, More, Wallis, Cudworth, Stanley, Dalgarno, Ray, Grew, Cumberland, Burnet, Norris, Mun, Overbury, Howell, Feltham.

Privileges of Parliament.

It was under the Lancastrian kings that the privileges of Parliament first began to attract attention. As enjoyed by either House, either corporately or individually, these immunities are various and important.

They all rest either upon the ancient law and custom of Parliament, or upon that law and custom defined by statute. The three most important are—

(*a*) Freedom of speech;

(*b*) Freedom from arrest, and special protection from assault;

(*c*) Freedom of the Commons to determine contested elections.

(*a*) *Freedom of Speech.*

In 1397 Sir Thomas Haxey was condemned as a traitor for introducing a bill complaining of maladministration, but being a priest he was pardoned, and in 1399 his sentence was twice reversed and annulled.

In 1400 Henry IV. declared his intention not to listen to any but formal and authorised reports of the proceedings of the Commons, and in 1407 he acknowledged the independent right of free discussion to reside in both Houses.

In 1455 Thomas Yonge, M.P. for Bristol, 'had justice done him' respecting his unlawful imprisonment for a motion made by him in the Commons.

In 1512 Richard Strode, M.P. for Plympton, in Devonshire, having been imprisoned by the Stannary Court for proposing certain bills in Parliament, was delivered by a writ of privilege, and a statute was passed declaring that any punishments inflicted upon or proceedings taken against members of Parliament 'for any bill, spekyng, reasonyng, or declaryng of any mater, concernyng the Parliament be utterly voyd and of none effecte.'

In 1541 the Commons for the *first* time included freedom of speech among their 'ancient and undoubted rights and privileges,' claimed from the king at the commencement of each Parliament.

In 1621 the Commons declared that every member was free from punishment for his Parliamentary speeches, '*other than by censure of the House itself.*'

The last occasion when this right was attacked was in 1630, when a corrupt judgment was obtained in the Court of King's Bench against Eliot, Holles and Valentine for their speeches in the Commons.

But in 1661, 1667, and in 1668, this judgment was declared to be illegal.

Finally, in 1689 the 9th Article of the Bill of Rights said, 'Freedom of speech and debates or proceedings in Parliament ought not to be impeached or questioned in any Court or place out of Parliament.'

(*b*) *Freedom from arrest and special protection against assault.*

This dates back even to the Heptarchy. Ethelbert, the first Christian king of Kent, in 600 A.D. provides that no member of the gemôt shall be molested on his way to or from the assembly. Likewise did Knut and Edward the Confessor enact: 'except it be for treason, felony or breach of the peace.'

Again in 1290, in the case of the Bishop of St. David's, and in 1315, in the case of the Prior of Malton, this right was vindicated.

Also in 1403 by Henry IV., in 1432 by Henry VI., and in 1477 by Edward IV., this privilege was acknowledged.

In 1543 for the first time the Commons released one of their number without any process in the Courts, 'only by show of their sergeant's mace, which was his warrant.'

In 1603 the case of Sir Thomas Shirley caused an Act to be passed which provided that—

(*a*) Every member should have freedom from arrest.

(*b*) Either House could set a privileged person at liberty.

(*c*) Either House could punish those who made or procured arrests.

(*d*) No officer should be liable for discharging any person possessing 'privilege of Parliament.'

This freedom from arrest has been always limited to civil causes, and has never been allowed to interfere with the administration of the criminal law.

As regards 'Contempt of Court,' each case is considered upon its merits, and the protection of privilege would be allowed, except in flagrant instances.

Charles I.'s flagrant attempt to violate this right in the very House itself is well known.

(*c*) *Right to determine contested elections.*

In 1384 and 1439 cases of disputed elections were adjudicated upon by the King and Lords *without aid from the Commons.*

In 1553 and 1586 the Commons themselves decided upon the legality of two elections, and refused to allow that the Lord Chancellor and the judges had any power of interference.

In 1604 the Lower House obtained from James I. the recognition of this right after a lengthy struggle.

The exclusive jurisdiction of the Commons in matters of election, which for the sake of their own independence they had been compelled to insist upon, became subsequently prostituted for party purposes, especially under George II. and George III.

At length, as late as 1868, the trial of controverted elections was transferred to the judges of the superior courts of law.

Government Questions for Fourth Monday.

Males.

1. Name two great navigators, two great writers, and two great statesmen of Elizabeth's reign, and say what they did. State the causes of the war between England and Spain. (1887.)

2. Name the chief legislative Acts of the time of Henry VII. (1886.)

3. What were the chief maritime enterprises and discoveries of the Tudor period? (1886.)

4. Write out a short life of Catherine of Aragon, *or* of Mary Queen of Scots. (1885.)

5. Trace the descent of Lady Jane Grey, Lord Darnley and Lady Arabella Stuart from Henry VII. (1884.)

Selected Government Questions in School Management.

(for first and fourth Saturdays.)

1. What processes of thought are required for accurate classification? Say what subjects of school instruction furnish the best discipline in classifying objects, whether mental or physical. (1888.)

2. What are the requirements of the Code in Arithmetic, English and Geography of the Fifth Standard, and what books should be in use in it? (1888.)

3. (*a*) In the Class Registers, how will you ensure the correctness of (i.) the number entered at every meeting at the foot of the attendance columns? (ii.) of the total attendances of the week and of the quarter?

How would you deal with the registration of scholars who came too late to be marked in the registers?

How would you mark holidays, and days devoted to examinations in religious knowledge?

(*b*) (i.) If the school attendance is irregular, describe in what form you could from the registers draw up a statement to put this irregularity in a striking light? (ii.) How do you find the average number of times attended per week by each child present at all, and of what use is this number? (iii.) How would you record punctual attendance? (iv.) Why would you write up the daily attendance in view of the school? (1889.)

4. (*a*) What do you mean by the *closing* of a Class Register for a morning or afternoon sitting? What acts of carelessness or irregularity on the part of teachers and scholars should be guarded against on these occasions?

(*b*) What facts should be recorded in the Admission Register, and in what circumstances may a name be removed from it, or be inserted in it a second time?

(*c*) (i.) What exceptions are admitted to the general regulation that in order to receive a grant a public elementary school must be open at least 400 times in the year?

(ii.) Describe a scheme of attendance prizes.

(iii.) How would you calculate the attendance for a Government Examination held at (1) an interval of seven months from the last inspection? (2) at an interval of fifteen months? (1887.)

5. Discuss the advantages and drawbacks of having a different classification for each subject.

6. What are the merits and demerits respectively of individual, sample and class examination?

7. What is understood by a proposition, a premiss, a conclusion, and a syllogism? Give an example of each. (1889.)

8. A generic term *denotes* a larger number of objects than a specific term; but it *connotes* a smaller number of attributes. Explain this statement and illustrate it by examples. (1889.)

9. What do you understand by a well-ventilated room? Explain with diagrams some effective form of window ventilation for a class-room, and give an estimate of the amount of fresh air required by each person. (1888.)

10. What forms of recreation would you prefer? and what games would you discourage in the playground? (1886.)

11. Write *full* notes of a lesson on one of these topics:

(*a*) A Kitchen. (*b*) A Glacier. (*c*) The Infinitive Mood. (1883.)

12. Show by means of *brief* notes of a lesson on *one* of the following subjects how you could help a scholar to think out and find a rule or principle for himself:—

Multiplication of Fractions; The Choice of Food; The Formation of Abstract Nouns from Adjectives. (1883.)

13. Give Spencer's definition of Education, expand it, and state whether you consider it defective or too comprehensive. Give reasons.

14. Summarise Spencer's remarks upon Pestalozzi and the principles of his educational system.

Questions in Geography.

For Second Saturday.

Males and Females.

1. Draw a sketch map of New South Wales, *or* of Northern Hindostan, particularly attending to the Ganges and Indus.

2. Give a lesson on the Trade Winds as affecting various parts of the British Empire.

3. From which of our dependencies respectively do we get—sugar, coffee, tea, tobacco, wool, cotton, flax, hides, copper, gold, diamonds, palm oil, fish oil, oranges, pine apples, grapes, timber, cabinet woods, furs, petroleum?

4. Write what you know about *six* of the following:—Grahamstown, Hobart, Churchill River, Lagos, Vindhya Mountains, Christchurch, Quetta, Clutha River, Lahore, Spanish Town, and the Liverpool Range.

5. Mention briefly our African (1) Colonies, (2) Dependencies, and (3) the regions within our 'sphere of influence.'

Males only.

6. Explain why in the belt between the tropics the sun appears vertical in the sky twice a year. Why does not an accurate clock always indicate twelve when the sun is on the meridian? Why are three of the leap years ordinary years in each cycle of 400 years?

7. How is rain formed? Why is the rainfall in West Britain greater than on the east coast? Explain why the country on the Eastern Ghats receives comparatively little rain.

8. Give some account of the plants and animals found in Australia.

9. Explain the causes of land and sea breezes. Describe briefly the cause and course of the equatorial current.

10. Prepare the outline of a lesson to the Seventh Standard upon *tides.*

Females only.

6. Describe the position of the following colonies and dependencies, and state when and how they became connected with this country:—Australia, Bermuda, Hindostan, Tasmania, Honduras, Natal, West African Settlements, Ceylon, Mauritius, Singapore.

7. Write notes of a lesson for an upper class of girls on the industries of New Zealand.

8. Give sketch maps of any two of the following:—British North America, Cape Colony, the British West Indies, the Shannon.

9. Trace a cargo of coals leaving Newcastle in September and reaching Vancouver in January, noting change of *climate*, *daylight* and *seasons*.

10. Write a letter home from a settler in Manitoba *or* Queensland.

CORRESPONDENCE.

1. *We shall be pleased to reply briefly and through this column to any seeking information or advice. Endorse* 'CERTIFICATE EDITOR' *if the office be communicated with.*

2. *Replies demanding urgency will be promptly forwarded per post on receipt of stamped and directed envelope. This privilege does not extend to furnishing solutions and answers to examination questions. A post will be saved by addressing direct to Macclesfield. Upwards of one hundred letters were thus answered in 1889.*

3. *Any suggestions tending to the greater utility and interest of these articles, or to the greater convenience of* 'COACH' *or* PUPIL, *will be thankfully received and thoughtfully considered.*

4. UNITAS (Leeds).—(*a*) Only the first two chapters of Herbert Spencer on Education are required. (*b*) By all means read the remainder *if you have time.*

T. C. (Kippax).—Your wishes have been consulted in this month's article. See also answer to J. L.

R. M. (Belfast).—C. Smith's Algebra, published by Macmillan, is every way suitable, and Selby's Bacon's Essays is a thoroughly good edition for the Certificate Examination.

J. L. (Leamington).—In 1584 Elizabeth entered into a treaty with the Dutch Republic, agreeing to furnish 6,000 men and to advance a loan on receiving in pledge the '*cautionary towns*' Flushing, Rammekins, and Brill. They were released in 1616 on payment of one-third of the subsidy.

PRIVILEGE (Bradford).—See answers to T. C. and J. L. We are much obliged for your kind remarks.

ONLY (Plymouth).—Your absence will not render you ineligible.

Z. (Hammersmith).—It cannot be done by any one in the time.

G. B. (Exeter).—Life of Lord Lawrence is published by Macmillan, Bedford-street, London. Price 2s. 6d.

A. N. (Huddersfield).—Show up notes.

S. E. S. (Ipswich).—The matter shall be well considered before next issue.

5. W. H. RIDLEY (Newcastle-on-Tyne), two letters, J. T. (Wilden), J. R. E. (Portmadoc), H. S. C. (Caversham), W. O. (Woolwich), UNSUCCESSFUL (——), A. S. (Middlesbro'), W. P. (Hartford), S. N. (Carmarthen), C. S. (Richmond), R. K. (Bath), and J. S. (Bamber Bridge), T. B. (Penzance), M. S. C. (Churwell), H. A. M. (Cranleigh), J. S. (Worcester), U. L. (Dover), R. A. (Wigan), answered per ordinary letter.

(To be continued.)

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Quarterly Arithmetical Tests.

BY JOSEPH WOLLMAN,

Head Master of the Wellgate Board School, Rotherham.

STANDARD I.—FIRST QUARTER.

1. 6
49
273
8
51

2. 659
24

3. 783
160

4. A woman had five hens. One laid in a year 86 eggs, another 79, another 65, another 104, and the other 93. How many eggs did she get altogether?

SECOND QUARTER.

1. 84
327
90
563
9

2. 534
474

3. 150
49

4. One school has 736 scholars, and another has 809. How many more scholars has the second school than the first?

THIRD QUARTER.

1. 759
16
802
97
985

2. 347
58

3. 902
896

4. A farmer bought 300 sheep. He sold 184, killed 17, and 5 died. How many had he left?

STANDARD II.—FIRST QUARTER.

1. 3,650 + 47,090 + 703 + 14 + 5,028 + 67 + 80,945 + 839.
2. Subtract 30,175 from 41,101.
3. 59,067 × 47.
4. A draper sold 58 yards of calico on Monday, 37 on Tuesday, 49 on Wednesday, 26 on Thursday, 34 on Friday, and on Saturday twice as much as on Friday. How much did he sell in the week?

SECOND QUARTER.

1. Multiply 9,536 by itself.
2. What is the difference between nine thousand and eighteen and fifty thousand?
3. Find the fifth part of twenty-three thousand and forty, and write the answer in words.
4. An excursion party went in 7 trains, each of which took 896 persons. How many went?

THIRD QUARTER.

1. 70,905 ÷ 9.
2. What is the product of 580 and 17,609?
3. How many more than 39,039 is 40,004?
4. A woman sold 552 eggs at the rate of eight for sixpence. How many sixpences did she receive?

STANDARD III.—FIRST QUARTER.

1. Divide five hundred thousand and thirteen by 47.
2. What is the product of 89,607 and 5,090?
3. 4,517,040 ÷ 638.
4. Divide 4,416 nuts equally among 59 girls and 37 boys. How many should each child get?

Second Quarter.

1. What is the amount of £461 12s. 5¾d., £7,036 11s. 8½d., £19 14s. 6¾d., £5,208 17s. 10¼d., £150 15s. 4d., £74 19s. 11¾d., and £385 10s. 9½d.?

2. A train travels 39 miles an hour, and goes 9 hours a day. How many days will it take to travel 16,497 miles?

3. Take nine hundred and eighty-seven pounds and eight pence farthing from one thousand and twenty pounds four shillings.

4. By selling a horse and a cow for £52, a farmer gained £5. The cow cost him 15 guineas. How much did the horse cost?

Third Quarter.

1. What must be taken from £47,006 14s. 6¼d. to leave £38,097 15s. 8¾d.?

2. £5,806 13s. 9½d. + £70,249 18s. 10¾d. + £715 16s. 8¼d. + £6,784 19s. 5½d. + £320 11s. 11¾d. + £49,038 14s. 7¼d. + 23 guineas.

3. Take the fifty-ninth part of 517,135 from one hundred thousand.

4. A gentleman spent £859 16s. 4½d. in a year, and saved £140 3s. 7½d. What was his income?

Standard IV.—First Quarter.

1. Divide seven hundred thousand and forty pounds ten shillings and ten pence halfpenny by 678.

2. How much is 406 times three shillings and seven pence farthing?

3. £539 17s. 10¾d. × 539.

4. A carriage and four horses cost 300 guineas. The carriage cost 58 guineas. What was the value of each horse?

Second Quarter.

1. How many half-sovereigns could you get for 287,040 farthings?

2. How many stones, &c., are equal to 590,068 drams?

3. If 13 sheep and 15 calves cost £150, and each sheep cost £3 15s., what did each calf cost?

4. Bring 175 miles 38 chains 3 po. 2 ft. to inches.

Third Quarter.

1. A coin weighs half an ounce. How many of those coins would weigh 3¼ tons?

2. A man earns 28s. 9d. weekly, and his two sons earn 7s. 9d. each. How much do they all earn in half a year?

3. Reduce four million five thousand and six square feet to acres.

4. A steamer goes to Australia in 6 weeks 19 hours, and returns in 7 weeks 3 hours. How many more minutes does the return journey take than the outward journey?

Standard V.—First Quarter.

1. What would it cost for 47 miles 2 fur. 9 po. at £13 6s. 8d. per mile?

2. Find the value of 785 suits of clothes at £2 18s. 4d. each.

3. If coals are bought at 12s. 2d. per ton, and sold at 15s. 6d. per ton, how much is gained on 29 tons 14 cwt. 3 qrs.?

4. A man bought 2,038 articles for a thousand guineas, and sold them at 16s. 8¾d. each. What did he gain?

Second Quarter.

1. If 17 miles of railway cost £14,458 10s., what will 12 miles more cost?

2. Find the value of 385 sq. yds. 5 ft. 100 in. at 6s. 9d. per square yard.

3. If a chest of tea weighing 3 cwt. 1 qr. cost £45 10s., what will 8½ lbs. cost?

4. Make a bill for—

102 eggs at 8d. per dozen;
27½ doz. eggs at 3 for 2d.;
19 score eggs at 9d. per dozen;
65 dozen eggs at 10 for 6d.;
98 eggs at 1s. 3d. per score.

Third Quarter.

1. Simplify:—$(\frac{1}{9} - \frac{1}{11}) + (\frac{1}{10} - \frac{1}{12})$.

2. What is the difference between the sum and difference of $\frac{7}{8}$ and $\frac{5}{12}$?

3. If 730 pecks of potatoes cost £69 3s. 11½d., find the value of 5 sacks, each containing 2¾ bushels.

4. A man left $\frac{3}{8}$ of his property to his eldest son, $\frac{1}{5}$ to the next, $\frac{1}{10}$ to each of two others, $\frac{1}{12}$ to the youngest, and the remainder to his niece. What was the niece's share?

Standard VI.—First Quarter.

1. Multiply the sum of ·63875 and ·429 by the difference between ·3904 and ·407.

2. Divide the sum of $\frac{1}{2}\frac{9}{4}$ and $\frac{2}{3}\frac{3}{0}$ by their difference.

3. Simplify:—($\frac{3}{4}$ of ·5895 × ·074) ÷ ($4\frac{5}{8}$ − $\frac{1}{8}$ of 8·58). (Answer to five places of decimals.)

4. How much greater is $2\frac{5}{9} \times 1\frac{3}{7}$ than $2\frac{6}{9} \div 1\frac{3}{7}$?

Second Quarter.

1. If an English sovereign is worth 25·25 francs (French), what is the value of 675·4375 francs?

2. What is ·68 of 4 tons 16 cwt. 3 lbs.?

3. Reduce $2\frac{3}{4}$ of 2 ft. 8 in. to the decimal of 3 chains.

4. Find the value of

$$\frac{(\frac{4}{6} - \frac{3}{11}) \div 5\frac{3}{11}}{\frac{2}{5} + \frac{2}{9}} \text{ of a guinea.}$$

Third Quarter.

1. What is the simple interest on £568 15s. for 219 days at 3½ per cent.?

2. Two pieces of cloth contain 108 yards and 126½ yards, and the longer is worth £2 15s. 6d. more than the shorter. What is the value of another piece containing 97¾ yards?

3. After spending ·57$\dot{1}\dot{6}$ of my money I had £2 2s. 10d. left. How much had I at first?

4. What sum will amount to £558 17s. 6d. in 7 years at 4½ per cent.?

STANDARD VII.—FIRST QUARTER.

1. A bankrupt has property to the value of £382 10s. He paid 7s. 6d. in the £ on half his debts, and on the other half he paid 9s. 6d. in the £. What was the amount of his debts?

2. A can do a piece of work in $3\frac{1}{3}$ days, B can do it in $3\frac{3}{4}$ days, and C can do it in $3\frac{1}{5}$ days. How long would it take them working together?

3. In what time will £680 gain £61 4s. at $2\frac{1}{4}$ per cent. simple interest?

4. Three persons start in business together. A contributes £422 10s., B £483 15s., and C £381 5s. They gain £858 6s. 8d.; what is B's share?

SECOND QUARTER.

1. 3 ac. 3 ro. yielded 9 tons 15 cwt., 4 ac. 1 ro. yielded 13 tons 18 cwt., and $5\frac{1}{2}$ acres yielded 16 tons 14 cwt. What was the average per acre?

2. What sum will gain £10 16s. 7d. in four months at $5\frac{3}{4}$ per cent.?

3. If the value of a goose is to the value of a duck as 10 : 3, and the value of a duck is to the value of a chicken as 9 : 7, what is the value of a chicken when a goose is worth 15s.?

4. The amount taken for passengers in a penny 'bus was £1 7s. 9d. on Monday, 18s. 10d. on Tuesday, 15s. 8d. on Wednesday, 17s. 4d. on Thursday, 19s. 3d. on Friday, and £2 1s. 2d. on Saturday. What was the average number of passengers carried daily?

THIRD QUARTER.

1. In a mixture of brass and copper the former is 79 per cent. of the whole; what is the quantity of copper in $4\frac{3}{8}$ tons of the mixture?

2. How much Three-and-a-Quarter per Cent. Stock at $97\frac{1}{2}$ can be bought for £1,025 1s. 3d., brokerage being $\frac{1}{8}$ per cent.?

3. If eggs are sold at 3 for 2d. at a gain of 20 per cent., what is the gain per cent. when sold at 4 for 3d.?

4. Which is the better investment, railway shares at $89\frac{1}{2}$ paying $3\frac{1}{2}$ per cent., or shares at $105\frac{1}{4}$ paying $4\frac{3}{4}$ per cent.?

ANSWERS.

STANDARD I.

FIRST.	SECOND.	THIRD.
1. 387.	1,073.	2,659.
2. 635.	60.	289.
3. 623.	101.	6.
4. 427 eggs.	73 scholars.	94 sheep.

STANDARD II.

FIRST.	SECOND.	THIRD.
1. 138,336.	90,935,295.	7,878 + 3.
2. 10,926.	40,982.	10,213,220.
3. 2,776,149.	4,608.	965.
4. 272 yards.	6,272 persons.	69 sixpences.

STANDARD III.

FIRST.	SECOND.	THIRD.
1. 10,638 + 27.	£13,338 2s. 8½d.	£8,908 18s. 9½d.
2. 456,099,630.	47 days.	£132,940 18s. 5d.
3. 7,080.	£33 3s. 3¾d.	91,235.
4. 46 nuts.	£31 5s.	£1,000.

STANDARD IV.

FIRST.	SECOND.
1. £1,032 10s. 1¾d. + 576 q.	598 half-sovereigns.
2. £73 3s. 3½d.	164 stones 8 lbs. 15 oz. 4 drs.
3. £291,003 5s. 10½d.	£6 15s.
4. £63 10s. 6d.	11,118,714 inches.

THIRD.	
1. 232,960 coins.	3. 91 ac. 3 ro. 30 po. 22½ yds. 6 ft.
2. £57 10s. 6d.	4. 480 minutes.

STANDARD V.—FIRST.

1. £630 7s. 6d.	3. £4 19s. 1½d.
2. £2,289 11s. 8d.	4. £654 14s. 0½d.

SECOND.

1. £24,664 10s.
2. £130 3s. 0½d.
3. £1 1s. 3d.
4. 5s. 8d. + 18s. 4d. + £1 3s. 9d. + £1 19s. + 6s. 1½d. = £4 12s. 10½d.

THIRD.

1. $1\frac{11}{16}$.	3. £5 4s. 3¾d.
2. $\frac{5}{6}$.	4. $\frac{3}{10}$.

STANDARD VI.

FIRST.	SECOND.	THIRD
1. ·01772465.	£26 15s.	£11 18s. 10½d.
2. $62\frac{1}{2}$.	3 tons 6 cwt. 17 lbs.	£14 13s. 3d.
3. ·01853...	·037.	£5.
4. $1\frac{1}{16}$.	3s. 4½d.	£425.

STANDARD VII.

FIRST.	SECOND.	THIRD.
1. £900.	2 tons 19¾ cwt.	18 cwt. 1½ qrs.
2. $1\frac{1}{13}$ days.	£565.	£1,050.
3. 4 years.	3s. 6d.	35 per cent.
4. £322 10s.	280 passengers.	Shares at 105½.

Practical Perspective for Pupil Teachers.

BY

E. G. BAKER, B.SC., B.A.,

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THE method employed in figs. 42 and 43, and the Exercises which follow, for obtaining the angular points of the figures drawn on the vertical faces of the solids, is one which will have to be constantly resorted to in what follows, and so it will be well to call special attention to it.

Notice therefore that the angular points required are obtained by means of vertical and horizontal lines, the angular points being the points of intersection of those lines.

The following exercises, the solutions of which are shown in fig. 44, are applications of the same method. Re-work them to the scale $\frac{1}{2}$ in. to 1 ft.

EXERCISES.—Problem 1.—Draw the perspective representation of a vertical hexagon, sides 2 ft. long, standing on one of its sides, upon the ground plane. The nearest point on the ground plane is 3 ft. to the left and 1 ft. in the picture, and the vertical plane of the hexagon makes an angle of 45° with the picture plane towards the right. The spectator is 5 ft. high, and stationed 10 ft. away from the picture plane.

DIRECTIONS.—The elevation of the hexagon must be drawn, but half of it will be sufficient. Its plan will be CD. Note that A is the nearest point. Draw a height line at K, after projecting CD in the usual way. Make KM and ML each equal to CE. The remainder will explain itself.

Problem 2.—Place in perspective a hexagonal prism 4 ft. long, whose ends have the dimensions of the hexagon described in Problem 1. The prism rests on the ground plane on one of its rectangular faces, and the nearest point of the solid is 3 ft. to the right, and 1 ft. in the picture. The axis recedes from the picture plane towards the right at 45°.

The spectator is 5 ft. high and 10 ft. away from the picture plane.

DIRECTIONS.—The end elevation will be the same hexagon as in Problem 1. Note that the nearest point of the solid will be the corner F, which is vertically above D. The plan will not give any trouble. Place the nearer hexagon in perspective as in Problem 1. Then complete the projection of the plan. Then from the points on the further end corresponding to D, B, A and C erect perpendiculars to meet the lines drawn from the angles of the nearer hexagon to VP on the right. The intersections will give the other angles of the solid. Observe that the VP on the left may afterwards be used to test the accuracy of the work.

PROBLEMS.

Scale ½ in. to the foot.

Height of spectator 5 ft. Distance from picture plane 11 ft.

1. Place in perspective a right pentagonal prism standing on one of its rectangular faces on the ground plane. The two vertical pentagonal ends recede from the picture plane at angles of 40° towards the right. The sides of the pentagons are 2½ ft. long, and the axis of the solid is 6 ft. long, while the nearest point on the ground plane is 3 ft. to the right and 2 ft. in the picture.

N. B.—The elevation of the ends must first be drawn, and the plan obtained by its aid.

2. Place in perspective a right octagonal prism resting on the ground plane on one of its rectangular faces. The sides of the octagonal ends are 1½ ft. long, and the axis is 5 ft. and recedes from the picture plane at an angle of 50° to the right. The nearest point is 2 ft. to the left and 1 ft. in the picture.

Note that the nearest point is not on the ground plane. Draw the elevation of an end and proceed as for the hexagonal prism in fig. 44.

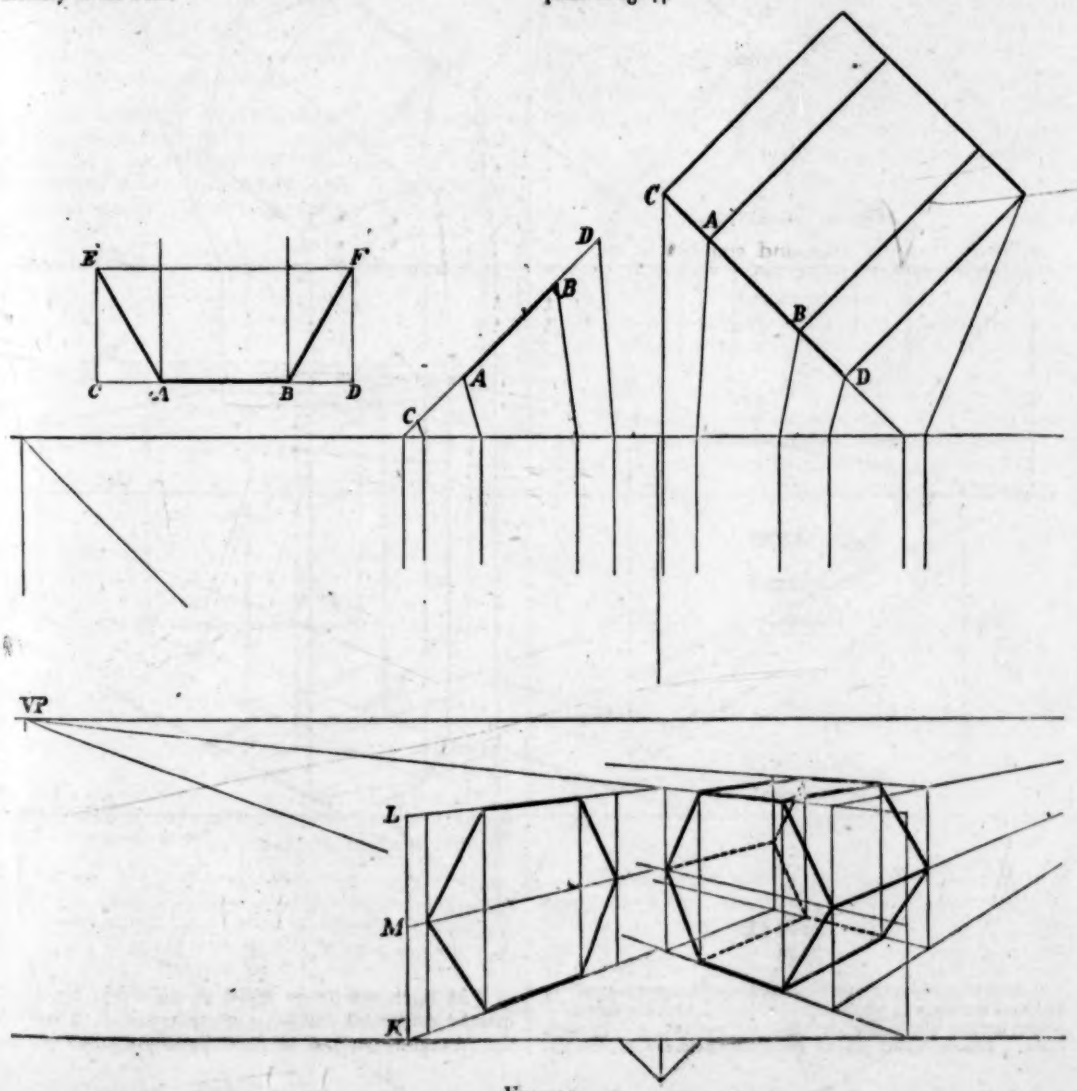


Fig. 44.

The projection of vertical polygons, it will be noticed, is effected by means of vertical and horizontal lines, the points of intersection of which give the angular points of the polygons. A similar method is pursued to obtain the projection of polygons in horizontal planes, the angular points being obtained by means of intersecting horizontal lines. The following exercise, which is solved in fig. 45 (1), should be studied carefully.

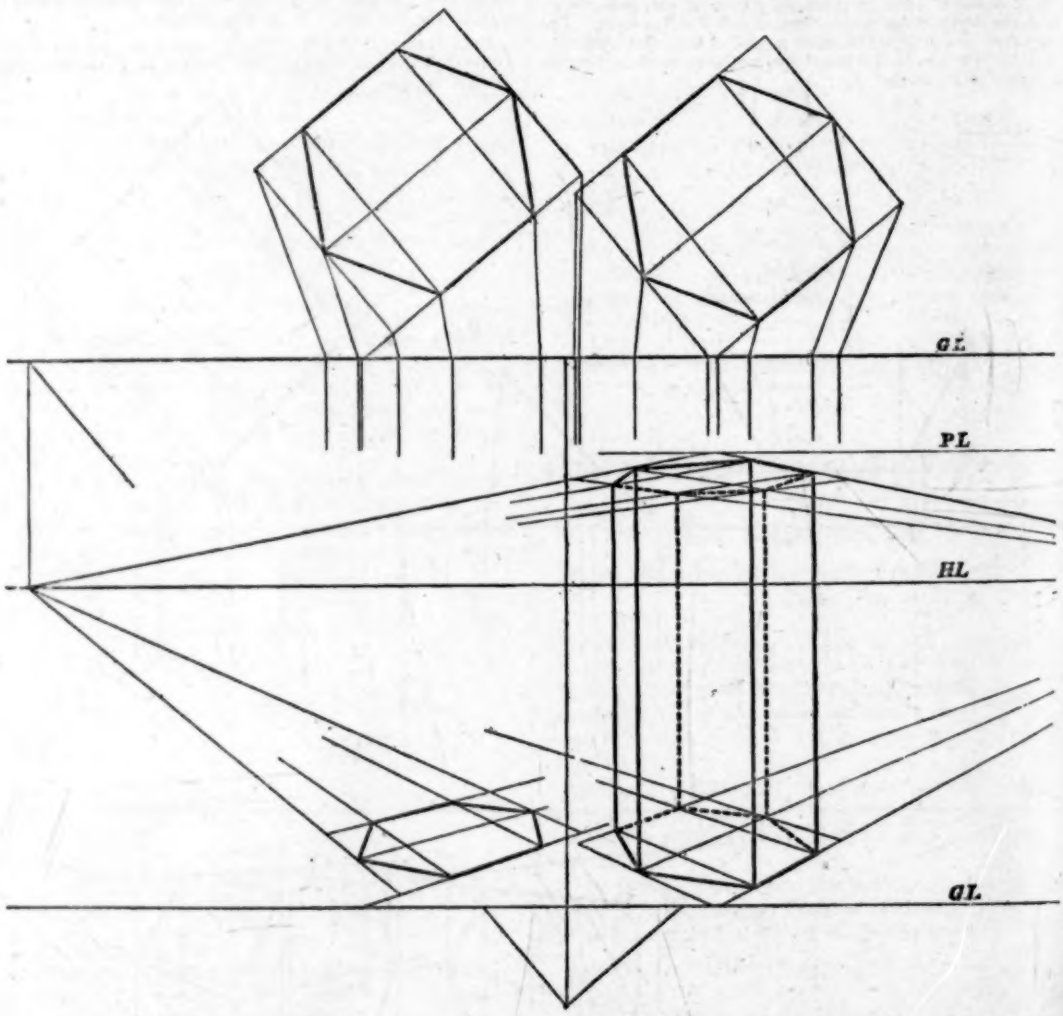
EXERCISE.—Place in perspective a hexagon, sides 2 ft. long, lying on the ground plane with its nearest angle 2 ft. to the left and 1 ft. in the picture. From the nearest angle one side recedes towards the right at an angle of 40°. The spectator is 10 ft. from the picture plane and 5 ft. high.

Re-work the exercise to the scale of ½ in. to 1 ft., following the directions below.

The exercise worked in fig. 45 (2) is inserted for the special purpose of showing how to proceed when the two nearer sides of the rectangle which is drawn around the polygon do not come to an angle before intersecting the ground line.

In such a case only those parts of the sides of the rectangle which lie behind the picture plane can be projected. This will appear when it is remembered that the plane of projection must be between the eye and the object. The method by which the top of the prism is obtained is already familiar to the pupil. The problem is as follows and should be re-worked.

PROBLEM.—Place in perspective a hexagonal prism 8 ft. high, standing on one of its ends on the ground plane. Its nearest angle on the ground plane is 3 ft. to the right and ½ ft. in the picture. All other measurements are the same as in fig. 45 (1).



(1) Fig. 45. (2)

DIRECTIONS.—First draw the plan of the hexagon in position, and then enclose it in a rectangle, arranging that the vanishing points for the side of the rectangle are not out of convenient reach. The remaining part of the construction explains itself.

With reference to the problems solved in fig. 45, it may be remarked that it is quite possible to project the hexagons without the rectangle and other added

lines. Each pair of opposite sides may be projected separately, as in the early problems for the projection of single lines.

But three vanishing points will be required instead of two, and in the position given, one of those vanishing points would be so far to the left as to be out of reach.

PROBLEMS.

Spectator 5 ft. high and 10 ft. from the picture plane. Scale ½ in. to the foot.

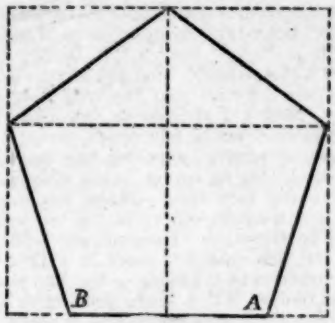


Fig. 46.

1. The drawing in fig. 46 is the plan to full scale of a right pentagonal prism standing on the ground plane, the point A being 2 ft. to the left and 1 ft. in the picture, and the side AB making an angle of 30° with the ground line. The prism is 3 ft. high. Project it.

The dotted lines show the methods of obtaining the angles.

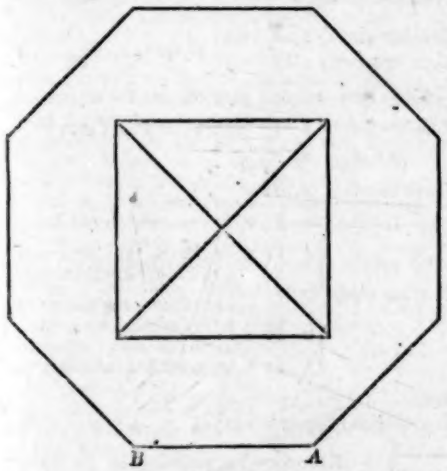


Fig. 47.

2. The figure (47) gives the plan to full scale of a right octagonal prism 2 ft. high, standing on the ground plane in such a position that the point A is 1 ft. to the right, and touching the picture plane, while AB makes an angle of 40° with the ground line. Centrally on the prism stands a square pyramid 4 ft. high. Represent both solids in perspective.

The picture line used for the top of the prism must be used for the base of the pyramid, and from it the height line will be erected, which measures the height of the pyramid.

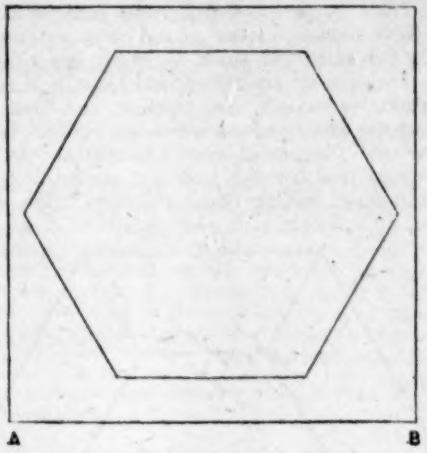


Fig. 48.

3. The drawing in fig. 48 is the plan to full scale of a slab on a square base, having a right hexagonal prism resting on it. The slab stands on the ground plane, and the point A is 1 ft. to the left, and ½ ft. in the picture, while AB recedes from the picture plane to the right at an angle of 45°. The slab is 1 ft. thick and the prism 6 ft. high.

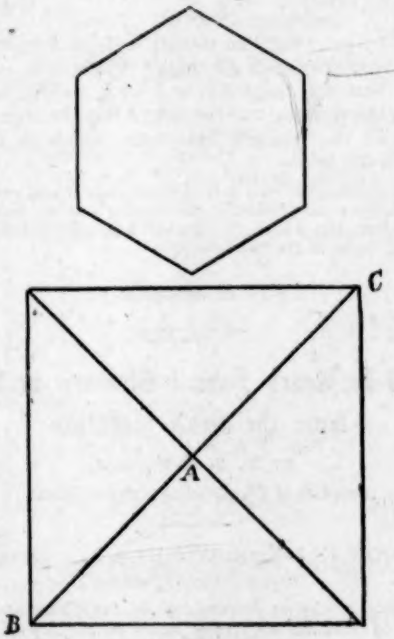


Fig. 49.

4. Fig. 49 is the plan to full scale of two solids, a hexagonal prism and a square pyramid, standing side by side on the ground plane, the centre (A) of the base of the pyramid being 4 ft. to the right and 3 ft. in the picture, and the diagonal BC of the base inclined at 80° to the ground line towards the right. The prism is 3 ft. high, and the pyramid 6 ft. Place the two solids in perspective.

5. Place in perspective a right hexagonal prism 3 ft. high, standing on the ground plane on one of its hexagonal ends, the sides of which are 1 ft. long. The nearest point on the ground plane is in front of the spectator and 3 ft. in the picture, and from it one side of the base recedes towards the right at an angle of 10° with the ground line. Centrally on this place a rectangular slab with a base 4 ft. square, two of its vertical faces making equal angles with the picture plane. The height of the slab is 1 ft.

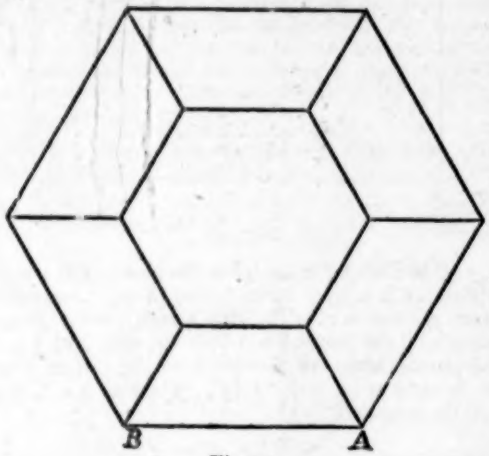


Fig. 50.

6. Fig. 50 is the plan to full scale of a frustrum of a hexagonal pyramid 4 ft. high. Place it in perspective so that the point A may be 2 ft. to the left and 1 ft. in the picture, and the side AB make an angle of 20° with the ground line, from which it recedes towards the left.

NOTE.—Draw the plan in the proper position, and project the two hexagons independently, the smaller one by means of a picture line 4 ft. above the ground line. Then join corresponding angles of the two hexagons.

(To be continued.)

—o—

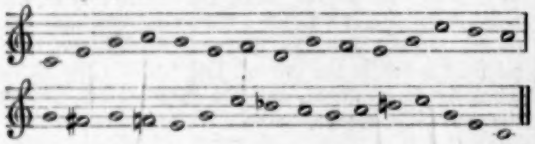
How to Teach School Children to Sing from the Staff Notation.

BY W. G. McNAUGHT,
Associate of The Royal Academy of Music.

DIVISION III.—STANDARDS III. & IV.—NOTE TEST. CODE REQUIREMENT.

To sing slowly as pointed out by the Examiner, using the sol-fa syllables, a series of notes in the key of C, containing an F sharp, contradicted by an F natural, and a B flat contradicted by a B natural. The F sharp should be approached by the note G and return to G as in the example, and the B flat should be approached by C and be followed by A as in the example.

Example :—



56. The most difficult advance over previous steps now required may escape attention because it is implied rather than expressed in the above quotation from the code. The requirements for the previous division exclude leaps to or from the second, fourth, sixth and seventh notes of the scale, but in the third division (standards III. and IV.) it should be understood that *all possible diatonic leaps must be studied.* It is important to know this, because while an average class can be taught the restricted use of the sharp fourth and the flat seventh as described above in a few weeks, twice as many months must be devoted to the practice of unrestricted leaps to and from diatonic notes.

57. The sharp fourth should have first attention. Teach it as an effect before any mention is made of theory and the sign for a sharp. Sing **s f m** (in any key). The class repeats the phrase. Sing the same to *laa*. Class repeats. Warn the class that you may now sing something new. Sing **s f m** again to *laa*. Anything new? Sing same again three or four times, each time inviting the class to say whether anything new was sung. Now sing **s fe s**—to *laa* of course. Probably all the class will observe the difference. Make the class imitate. Now sing **s f m** again, otherwise the old key-tone and effects will be forgotten. Demonstrate—still singing to *laa*—that the first and last tones in **s fe s** are alike. Draw the attention of the class to the fact that, whereas the second tone in **s f m** leads downward, the second tone in **s fe s** leads upward, just as **t** seems to ask for **d'**. Give the new tone the name **fe**, without at present explaining the word sharp or the derivation of the name from **fah**. Now sing **s fe s** to the sol-fa names. The class imitates. Now sing **s f m**, the class responding with **s fe s**. Reverse this, and then get pupils individually in turn to sing the two phrases, one taking one phrase, and the next, the other. Next write the name in its proper place on an upright scale of sol-fa syllables and point an easy exercise that continually brings in **s fe s f m**. The following is an epitome of the plan of the foregoing lesson :—

Teacher sings **s f m** } to sol-fa names.
Class responds **s f m** }

Class now warned to look out for alterations.

Teacher sings **s f m** three or four times
and then **s fe s**
Class imitates **s fe s**
Teacher sings **s f m** to re-establish old key.
s fe s to show that first and third tones are the same.
s f m } to show tendency of
s fe s } second tone.
s fe s introduction of name
} All to *laa*.

Teacher and class alternately **s fe s** } To sol-fa
then individual pupils in turn **s f m** } names.

Exercises for pointing on an upright sol-fa scale.

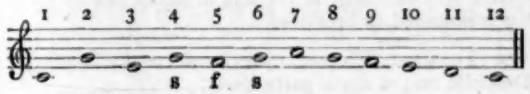
d'
t
l
s
fe
f
m
r
d

1. d m s l s f m r d s fe s s f m s l t d'
2. d s f m s l s s fe s s f m r m f m r d s s d
3. d m s fe s f m s l s d d' t l s fe s f m r d
4. m d d' s fe s f f m s fe fe s l s f m r t d'

58. The points to be attended to now are theoretical, viz. :—the convenient convention that regards one tone as the alteration—the sharp or flat of another, the signs to express these alterations and the construction of the scale as a series of 'tone' and 'semitone' steps.

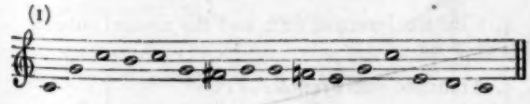
59. The construction of the scale should obviously come first, because in this way the need for the accidental sign is clearly seen. It is well at the outset to use the terms 'step' and 'half-step,' because the word 'tone' brings with it previously built up associations. All new *things* introduced, should have new distinct *names*. When the class has been shown, by blackboard diagrams, that the scale from **doh** to **doh**^{1} or from C to C^1 consists of 'full steps' and 'half steps' in an apparently irregular order, the facts presented can be best retained by noting the position of the half steps, viz., between **me** and **fah** (E—F in key C) and **te** **doh**^{1} (B—C^1 in key C). All other steps are then thought of as 'full.' Or the order may be said to be 'all full steps except between 3—4 and 7—8.'

60. The sharp and the natural must now be taught. Write a passage that can be easily adapted to show the need for the two accidentals.

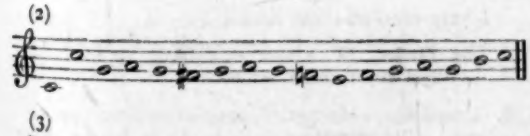


Announce that you wish to show **fe** after the fourth note. Remind the class that the step from F to C is a full one and inform the class that **fe** is only a half step below **soh**. Therefore, something must be done to show this half step. Inform the class that **fe** is always shown on the same line or space as **fah**. Then write immediately before the fifth note, a bold clear sharp. State that as musicians frequently describe sounds that are higher than others as sharper, this sign is called a SHARP [write the word on the board], because it raises by a half step the pitch of the note before which it is placed. Now announce that at the fourth note from the end you wish **fah** not **fe** to be sung. It will seem to some pupils that as they are not told to sing **fe** by a sharp placed just before the note, they are, of course, expected to sing **fah**. But it must be stated clearly to all, that it is often absolutely necessary to specially show that an altered note is to be altered back again, and that for this purpose a sign called a natural is frequently employed. The rule that an accidental has no influence beyond the bar in which it is written, should not be dwelt upon just now. The exercises given should be unbarred. Do not give the impression that the natural always brings a note down a half step. Explain it as a sign whose meaning can only be made clear by reference to some previous sign. When the functions of the sharp and natural are understood, draw particular attention to their formation, and if possible, get the class to write a score or so examples of each sign. The following are examples of the kind of exercises suitable at this stage. The introduction of the sharp fourth in other keys will be discussed in a later section.

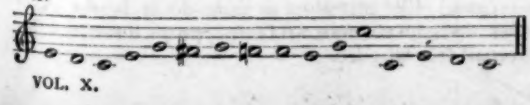
(1)



(2)



(3)



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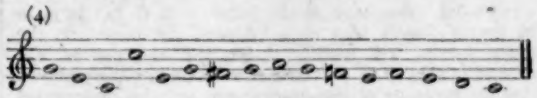


These are not code tests because difficult leaps to diatonic tones are avoided.

61. Much the same plan should be used in teaching the flat seventh as that described in section 57 for teaching the sharp fourth. Introduce the effect thoroughly and afterwards leisurely teach the sign. Teach the unknown from its unlikeness to the known. In first presenting the flat seventh, contrast **d**^{1} **t** **d**^{1} with **d**^{1} **ta** **l**, just as **s** **fe** **s** were contrasted with **s** **f** **m**. When the new effect is discovered and imitated, draw attention to the *dreariness* of its mental effect and to its downward tendency. Sometimes pattern **d**^{1} **ta** **l** as **s** **f** **m**, starting from the same pitch. The following is a condensed plan of the practical lesson to be given.

Teacher sings **d**^{1} **t** **d**^{1}
Class responds **d**^{1} **t** **d**^{1} } to sol-fa names.

Class now warned to look for alterations.

Teacher sings **d**^{1} **t** **d**^{1} three or four times
and then **d**^{1} **ta** **l**
Class imitates **d**^{1} **ta** **l** } All to *laa*.

Teacher sings
d^1 **t** **d**^{1} to re-establish old key.
d^1 **t** **d**^{1} } to show tendency of second tone.
d^1 **ta** **l**
d^1 **ta** **l** introduction of name } To sol-fa names.

Teacher and class alternately then individual pupils in turn
d^1 **ta** **l**
d^1 **t** **d**^{1}

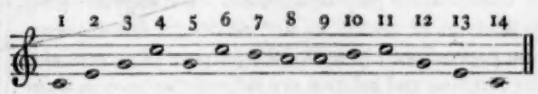
Another good phrase to contrast with **d**^{1} **ta** **l** is **l** **t** **d**^{1}. The teacher sings one of the phrases and the class responds with the other.

Exercises for pointing on an upright sol-fa scale.

d^1
t
ta
l
s
f
m
r
d

1. **d s m s d**^{1} **d**^{1} **ta l l t d**^{1} **s l s s d**
2. **m r d s m d**^{1} **ta l t d**^{1} **m s f m r d**
3. **s m d m s l t d**^{1} **d**^{1} **ta l t d**^{1} **m r d**
4. **d**^{1} **t d**^{1} **s d**^{1} **ta ta l l t d**^{1} **s m m r d**

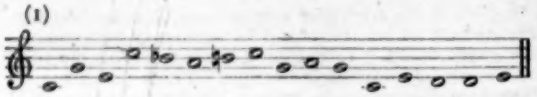
62. The flat can now be introduced. Write the following passage on the blackboard.



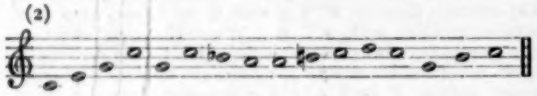
Announce that you wish to show **ta** at the seventh note of the exercise. Remind the class that the step from C^1 to B is a half-step, and inform the class that **ta** is a full step below **doh**^{1}. Inform the class also that **ta** is always shown on the same line or space as **te**. Then write immediately before the seventh note, a bold clear flat. State that as musicians frequently describe sounds that are higher than others as flatter, this new sign is called a FLAT [write the word on the board], because it brings down, by a half step, the pitch of the note before which

it is placed. Say that at the tenth note te not ta is to be sung. Pupils who have followed the lesson on the sharp fourth, will readily understand the use of the natural in this case. It can now be more clearly shown that the meaning of the natural can only be understood by reference to some previous sharp or flat. The following are examples of the flat seventh in the key of C.

(1)



(2)



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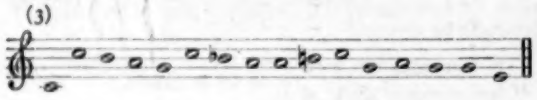
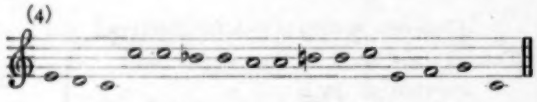


(4)



These are not code tests because difficult leaps to diatonic tones are avoided.

63. The terms *flat seventh*, *sharp fourth*, *tone* and *semitone*, should now be explained. It will be well also to occasionally point out that although in speaking of notes and in writing about them adjectives come after the alphabetical names—as F sharp or B flat—accidental signs are always placed *before* the notes to be affected.

(To be continued.)

—o—

Occasional Examination Papers.

IN many schools the teachers find it desirable from time to time to give general examinations with a view to promotion, re-classification, or the arrangement of the scholars in order of merit.

The greater freedom in classifying children according to their abilities and attainments now secured to teachers in elementary schools by the New Code of 1890, will largely increase the extent to which this use of examinations may be adopted. We therefore give, as likely to be useful to our readers, a few examination papers recently set for the purpose of ascertaining the progress and relative position of the boys in some classes varying in age from nine to 14 years.

We would specially call attention to the paper of mixed questions under the head '*General Knowledge*.' Such papers tend to waken the interest of children in what they see and hear, and what they read.

Answers to the questions in Arithmetic and Algebra are appended.

General Knowledge.

1 Name the persons who hold at present the following offices:—Prime Minister of England, Chancellor of the Exchequer, Archbishop of Canterbury, Bishop of London, Chairman of the London County Council, Commander-in-Chief of our Army, President of the French Republic, Pope of Rome, President of the United States. Add any important facts you know respecting three of them

2. Name any important work written by each of the following writers:— Edmund Spenser, Shakespeare, Defoe, Swift, Cowper, Bunyan, Byron, Scott, Kingsley.

3. State briefly the nature and use of each of the following:—A lens, a magnet, a camera, a spirit-level, a rain-gauge, a reservoir, a crucible, a test-tube.

4. Mention the various substances used as fuel, also the different means used for producing artificial light. Give a short account of the way in which one of each list is obtained or produced.

5. To what different uses is electricity applied? Describe one of these particularly.

6. Give the names of some of the most important English forest or timber-trees, adding anything you know respecting their appearance, growth, or use.

7. Make a list of wild flowers known to you by sight, and state, if you can, where they grow, and when they blossom.

8. Where and what are the following:—St. Paul's Cathedral, Albert Hall, British Museum, the Alhambra, the Coliseum, the Vatican.

9. Write an account of the work of some great man now living.

10. Say how you would treat a favourite bird or animal, choosing the sort you would like best to keep.

French.

1. Give the French, masculine and feminine, for (1) pretty, (2) bad, (3) good, (4) obedient.

2. Write out the Imperfect tense of être.

3. Give the plural forms of the following:—soir, la mère, elle a acheté un jardin, la voix, un mois, une croix, un bateau. Add the meaning in each instance.

4. Give the future of finir, and the present subjunctive of avoir.

5. Translate into French:—

I have read all these books.

The doctor, of whom you have spoken, has visited my brother twice.

6. Translate:—Ma petite sœur avait écrit tous ses exercices. Elle pria alors sa mère de la laisser aller jouer dans le champs avec ses jeunes amies. Elle revenait très fatiguée.

7. Give the French for 46, 79, 219, 1890.

8. Translate:—Un garçon qui, par méprise, reçut des coups de baton de ses parents, riait de toutes ses forces en disant: 'Les voilà bien attrapés; ils m'ont pris pour un autre.'

Arithmetic.

1. Add together 375; 126; 19; 270; 415; and 908.

2. Take five hundred and five from ten thousand.

3. Multiply 7,654 first by 7, and then by 98.

4. Divide 807,576 by 11, and also by 528.

5. How many farthings in £27 10s. 6¾d.?

6. Find the sum of £19 16s. 4½d.; £23 12s. 7¼d.; £179 0s. 9¾d.; £876 4s. 11½d.; £99 13s. 9¼d.; £27 15s. 10¾d.; and £86 11s. 10¼d.

7. A mansion and its furniture were valued at £32,000 16s. 6d. The mansion alone was worth £25,091 15s. 9d. What was the value of the furniture?

8. If a horse costs £27 16s. 8d., what will 37 such horses cost?

9. How much may a man spend every day whose income is five thousand pounds a year?

10. Make a bill for the following:—19 yds. of cloth at 7s. 9d. per yd.; 23 yds. of silk at 5s. 4½d. per yd.; 75 yds. of linen at 1s. 1½d. per yd.; 2 gross of buttons at 1s. 4½d. per dozen; 56 yds. of ribbon at 9s. 6d. per dozen yds.

11. If a bankrupt can pay 12s. 4½d. in the £, and his debts amount to £12,607 16s. 8d., what are his assets?

12. What principal will amount to £793 10s. 2d. in 5½ years at 4 per cent. simple interest?

13. If four men can earn as much as nine women, and 2 women earn as much as 3 boys, how many men can earn as much as 81 boys?

14. Simplify $\frac{33}{44}$ of $\frac{9}{77}$ of $\frac{20}{21}$ of $\frac{264}{363}$ and reduce the answer to a decimal.

15. Find the G.C.M. and the L.C.M of 3726 and 4554.

16. If a tradesman sold his stock for £1,517 5s., he would gain 19 per cent. on his outlay. For what must he sell it to gain 21 per cent.?

17. An estate consists of 3 farms; the first is ·27 of the estate, the second ·4375 of the remainder, and the third measures 347 acres 2 rds. 20 pls. What is the size of the estate?

Algebra.

1. What is an algebraical expression?

2. What is indicated by a^4, also by $(x+y)^2$.

3. If $a=2$, $b=3$, $c=4$, $d=5$, find the value of $ab+c^2+4(b+d)-4a^2$.

4. If $a=3$, $b=6$, $c=9$, and $d=100$, find the value of $\frac{2ab}{c}+\frac{3d}{b+c}-\frac{b+c}{a}$.

5. Also of $(\sqrt{c}+\sqrt{d})\sqrt[3]{(a^2+b^3-d)}$.

6. If I divide x sovereigns equally among y persons how many shillings will each receive?

7. Find the H.C.F. of $x^2-11x+30$, x^3-125, and $x^2+7x-60$.

8. Simplify $\frac{a}{a+b}+\frac{b}{a-b}-\frac{2ab}{a^2-b^2}$.

9. Multiply $\frac{a^2-7ab+12b^2}{a^2-19ab+60b^2}$ by $\frac{a^2-225b^2}{a^2+5ab-24b^2}$.

10. Solve the equation—

$$4(3x+7)-7=3(x+18)-15.$$

11. Solve $\frac{x+7}{x-1}=\frac{x-2}{x-3}+1\frac{1}{2}$.

12. A cistern, if empty, can be filled through a pipe A in 40 minutes, or through a pipe B in 60 minutes. There is a third pipe C, which would empty the cistern, if full, in 80 minutes. In what time would the cistern be filled if all three pipes were opened together?

ANSWERS.

Arithmetic.

1. 2,113.
2. 9,495.
3. 53,578; 750,092.
4. 73,416; 1,529 + 264 over, or 1,529$\frac{3}{11}$.
5. 26,427 farthings.
6. £1,312 16s. 3d.
7. £6,909 0s. 9d.
8. £1,029 16s. 8d.
9. £13 13s. 11$\frac{1}{13}$d. (or ½d. + $\frac{9}{13}$).
10. £7 7s. 3d. + £6 3s. 7½d. + £4 4s. 4½d. + £1 13s. + £2 4s. 4d. = £21 12s. 7d.
11. £7,801 1s. 11½d.
12. £650 8s. 4d.
13. 24 men.
14. $\frac{10}{13}$ = ·038610.
15. G.C.M. = 414; L.C.M. = 40,986.
16. £1,542 15s.
17. 849 acres 3 rds.

Algebra.

3. 38.
4. 19.
5. 65.
6. $\frac{20x}{y}$.
7. $x-5$.
8. $\frac{a-b}{a+b}$.
9. $\frac{a+15b}{a+8b}$.
10. $x=2$.
11. $x=5$ or $3\frac{1}{2}$.
12. 34$\frac{2}{7}$ minutes.

THE LITTLE HOUSEMAID.

Words by Rev. C. S. BERE. *Music by* T. CRAMPTON.

Allegretto. mf.
1st TREBLE.
2nd TREBLE.
BASS.
1. Come here my lit - tle housemaid trim(1), You have to clean a room; You'll
2. Then set to work and sweep a - way(5), Un - til the car - pet's clean; But
KEY F. Allegretto. mf.
want your brush and dus - ter blue(2), With your long - handled broom. Now cov - er up the
first take care a - bout the fire(6), No dirt must there be seen. Now then un - cov - er
C.t.
pret - ty things(3), The plates and cups and books; And pull the chairs all for - ward too(4), To
all the things(7), And bring the dus - ter too(8); Then rub them all quite nice and bright, There!
leave no hid - den nooks.
now dear, that will do.

(1) Beckon, as if calling someone. (2) Shake out hands as with a duster. (3) Imitate covering up articles. (4) Pull as if moving chairs. (5) Imitate sweeping. (6) Point to the fire. (7) Uncover furniture. (8) Imitate rubbing.

My Drawing Examination and how it was Conducted.

BY A HEAD TEACHER.

STANDARD I.

1. A horizontal line was drawn on the blackboard three inches in length.

2. A perpendicular line was drawn to this line of the same length.

3. A line was drawn bisecting the right angle, and of the same length as the other lines.

The above was drawn by the teacher at the request of the inspector.

The children were questioned at each step on horizontal and perpendicular lines, and on right, acute, and obtuse angles.

The children were then instructed to draw the figure, first with rulers and set squares, and afterwards freehand.

One figure was drawn on the upper half of the slate, the other on the lower half, a line separating them.

STANDARD II.

The inspector told the teacher to draw the following figure on the blackboard.

Then questions were asked by the teacher on the lines and angles in the figure.

The inspector then asked what was a right angle, and who could draw one. A boy was then asked to draw an obtuse angle.

The class were told to copy the figure on their papers, making each line 4 inches in length, first ruled and afterwards freehand, the papers being divided by a line drawn across the middle.

Ample time was allowed.

STANDARD III.

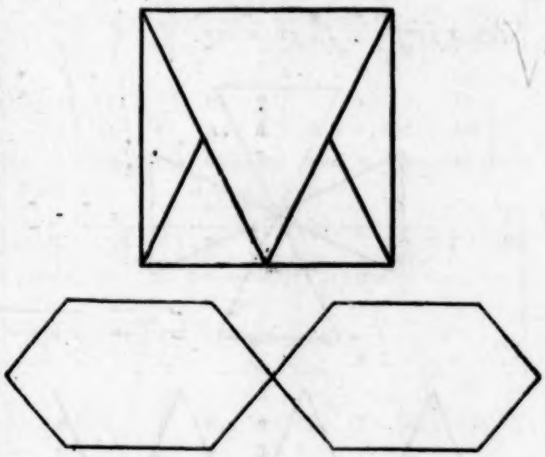
Half the class had to draw the following copy, first with rulers and set squares and afterwards freehand, a line being drawn across the middle of the papers, and the copies had to be as large as the paper would allow.

Time allowed 45 minutes.

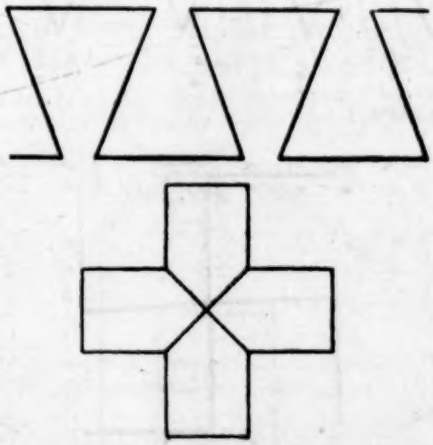
The other half of the class had each a copy with two figures, which had to be drawn with rulers and set squares, one under the other, and larger than the figures on the cards.

Time allowed 45 minutes.

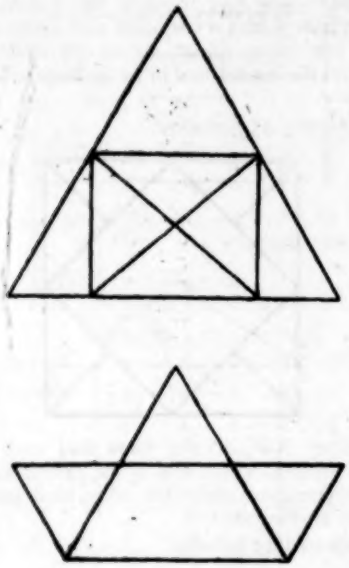
(Card I.)



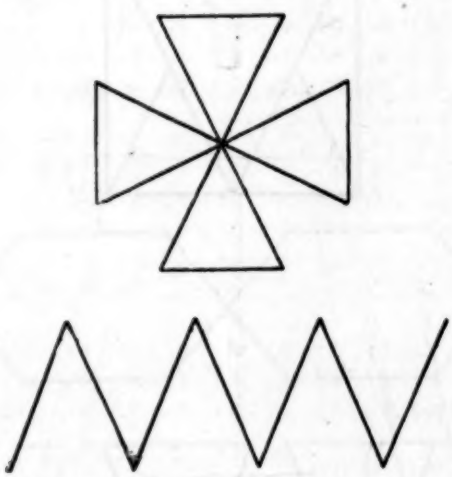
(Card II.)



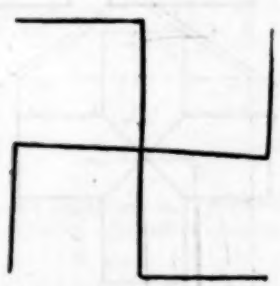
(Card III.)

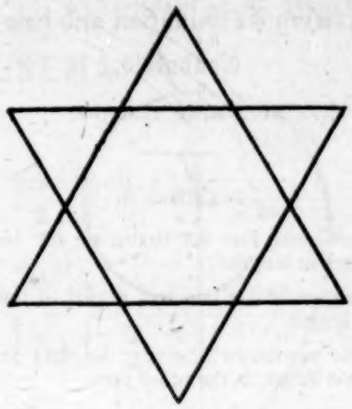


(Card IV.)

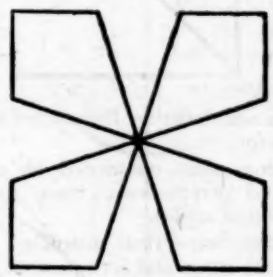


(Card V.)





(Card VI.)



STANDARD IV.

The class was divided into two parts. One half drew freehand, and the other half drew scale on squared paper.

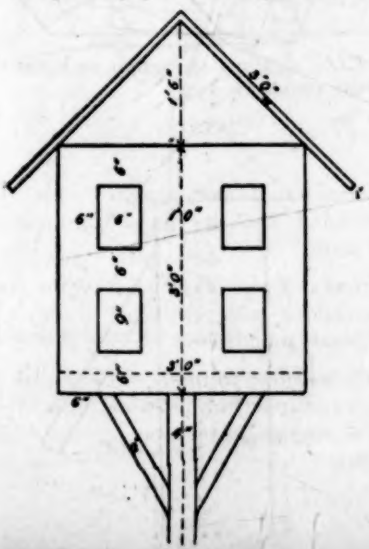
The freehand copy was pinned on the blackboard and the children were instructed to copy it as large as their papers would allow.

Cards were given to those who took scale drawing. Each card contained two problems, and no problems were given requiring plain paper. Time allowed was 45 minutes.

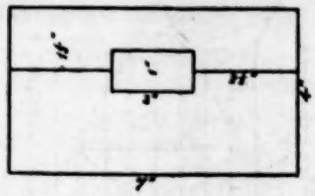
The following was the freehand copy.

The following were the problems :—

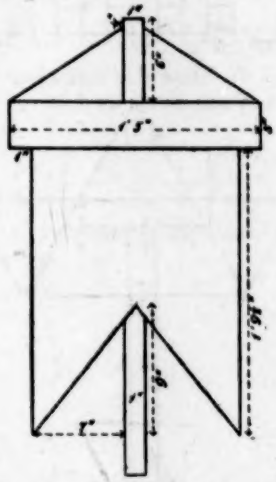
(Card I.) 1. This is the front view of a pigeon-house. Copy it on squared paper. Each square stands for 1 in.



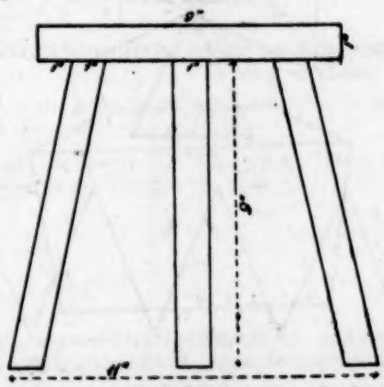
2. This is a drawing of a pocket book. Copy it on squared paper. Each square stands for $\frac{1}{4}$ in



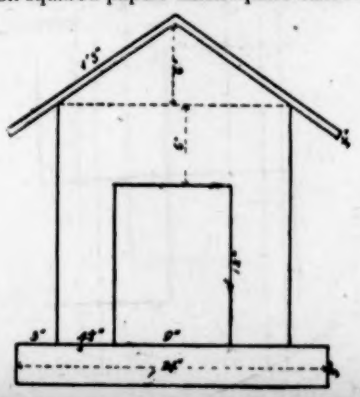
(Card II.) 1. Copy this banner on squared paper. Each square stands for 1 in.



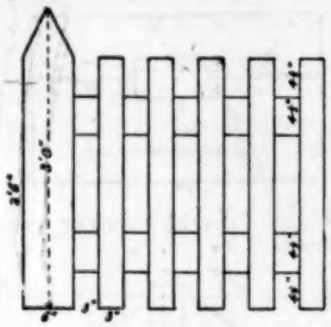
2. Draw the three-legged stool on squared paper. Each square stands for $\frac{1}{2}$ in.



(Card III.) 1. This is the elevation of a dog kennel. Draw it on squared paper. Each square stands for 1 in.

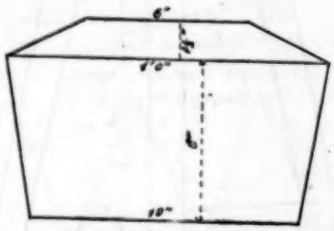


2. Copy this gate on squared paper. Each square stands for 3 in.

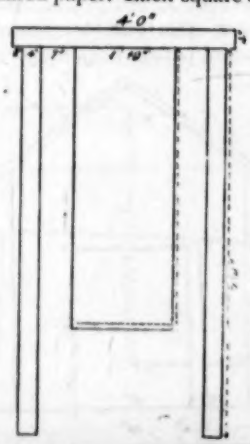


(Card IV.) 1. Draw this notice board on squared paper. Each square stands for 2 in.

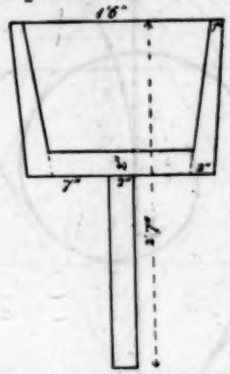
2. Draw this tea-caddy on squared paper. Each square stands for $\frac{1}{2}$ in.



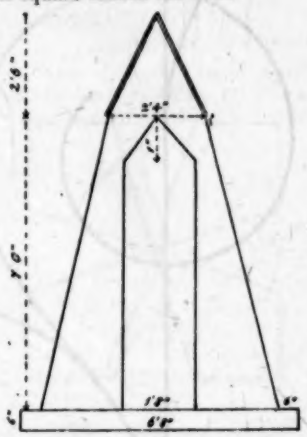
(Card V.) 1. This is the front elevation of a swing. Draw it on squared paper. Each square stands for 2 in.



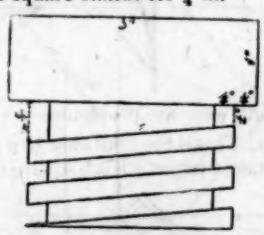
2. Copy this iron shovel on squared paper. Each square stands for $\frac{1}{2}$ in.



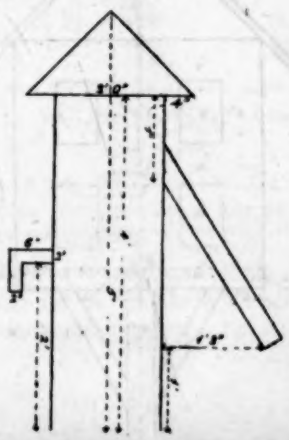
(Card VI.) 1. Draw the sentry box on squared paper. Each square stands for 2 in.



2. This is an iron screw. Draw it on squared paper. Each square stands for $\frac{1}{4}$ in.



Card VII. 1. Copy the pump on squared paper. Each square stands for 2 in.



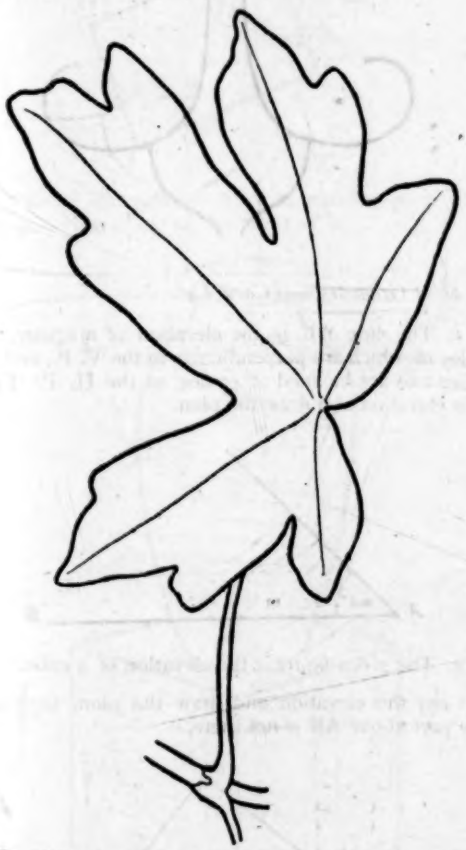
2. This is a drawing of a T square. Draw it on squared paper. Each square stands for $\frac{1}{2}$ in.

STANDARD V.

The class was divided into three parts, each third taking freehand, geometry, and model, respectively.

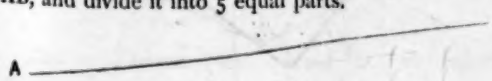
Time allowed was 50 minutes.

The following freehand copy was pinned on the blackboard, and the children were instructed to draw it as large as the paper would allow.



The following were the geometry cards:—

(Card I.) 1. Draw a line similar to the given line AB, and divide it into 5 equal parts.



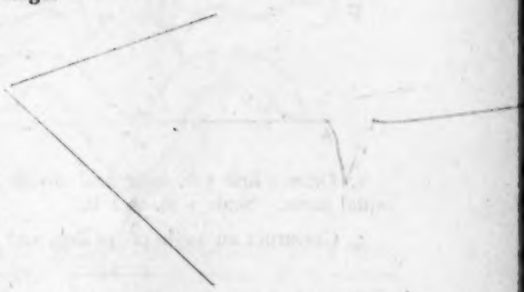
2. Construct a right angle, and bisect it.

3. Construct an isosceles triangle having a base of 2 in., and the angles at the base 45 deg.

(Card II.) 1. Describe a circle of 1 in. radius, and divide the circumference into 4 equal parts.

2. Copy the given right line AB, and upon it construct an equilateral triangle.

3. Copy the given angle, and then construct an angle half as large.



(Card III.) 1. Make an angle of 60 deg. and bisect it.

2. Draw an isosceles triangle with base 2 in., and he angle opposite the base 45 deg.

3. Copy the given line and point. Then draw a line parallel to AB through the point C.

(Card IV.) 1. Draw an isosceles triangle with angles at the base of 30 deg. and a base of 2 in.

2. Draw a right angle, and then bisect it.

3. Copy the given right line AB, and upon it construct a square.

(*Card V.*)

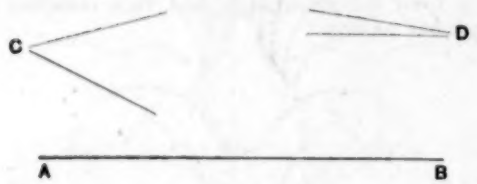
1. Copy the two given points, and then construct an equilateral triangle having one of its angular points at A and another at B.

2. Construct a right angle, and then divide it into four equal angles.

3. Draw a line $2\frac{1}{2}$ feet long, and divide it into six equal parts. Scale $1\frac{1}{2}$ in. to 1 ft.

(*Card VI.*)

1. Copy the given line and angles. Then construct a triangle having AB for its base, the angle at A equal to C, and the angle at B equal to D.



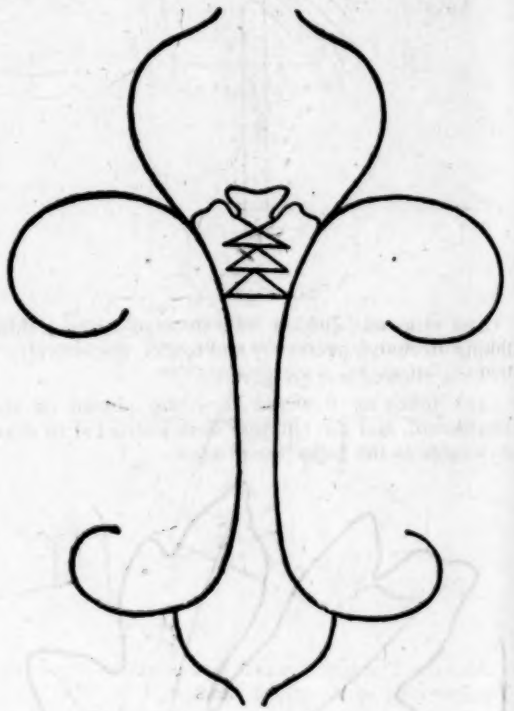
2. Draw a line 3 ft. long and divide it into seven equal parts. Scale 1 in. to 1 ft.

3. Construct an angle of 30 deg. and bisect it.

Model :—The model of a vase had to be drawn as large as the paper would allow :—

STANDARD VI.

Freehand :—The following copy had to be drawn as large as the paper would allow.

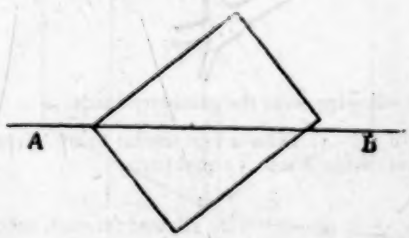


Solid Geometry :—(*Card I.*)

1. The line AB is the elevation of a square, two sides of which are perpendicular to the V. P., and the other two are inclined at 45 deg. to the H. P. Copy this elevation and draw the plan.

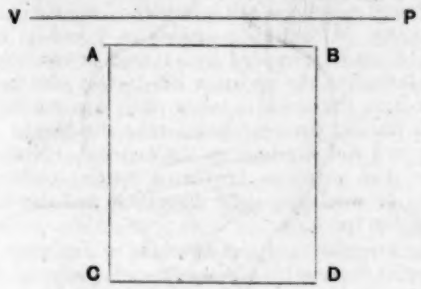
2. The given figure is the elevation of a cube.

Copy this elevation and draw the plan, supposing the part above AB is not there.

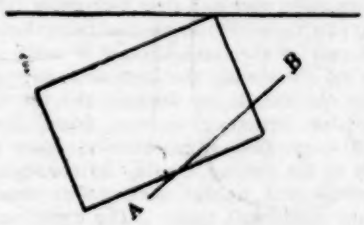


Card II.

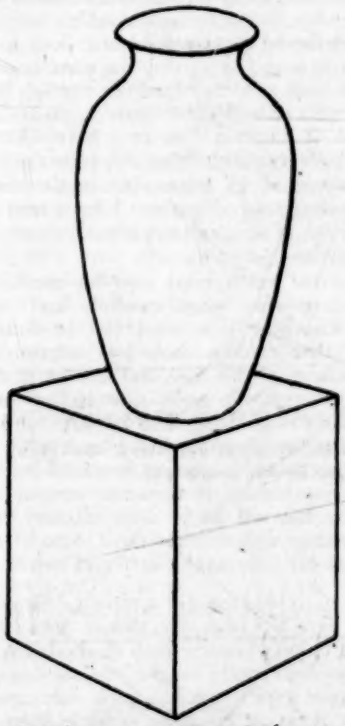
1. The given figure is the plan of a right prism, the bases of which, AB and CD, are squares. Copy this plan, and draw the elevation of the prism.



2. The given figure is the plan of a cube. Copy this plan, and draw its elevation, and also the elevation of the section made by the plane AB.



Model:—The model was a vase standing on a cube. The following is one of the views of it.



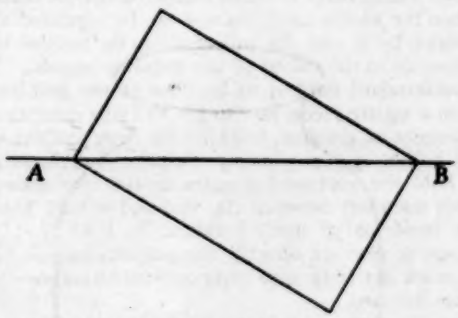
Note:—50 minutes were allowed for each subject.

STANDARD VII.

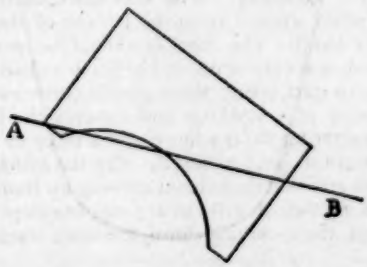
Freehand:—The following copy was pinned on the blackboard:—

Solid Geometry:—

1. The given figure is the elevation of a right cylinder, the axis of which is shown by a dotted line. Copy the elevation, draw the plan, and show section made by AB.



2. The given figure is the plan of a cube with a half cylindrical groove cut out of one side from top to bottom. Copy this plan, draw elevation, and show section made by AB.



Plane Geometry :—

1. To the scale of $\frac{1}{8}$ in. to 1 ft. draw a line representing 9 ft. 3 in.

2. Construct an equilateral triangle having sides of 2 in.

3. Describe a regular heptagon in a circle with a radius of $2\frac{1}{4}$ in.

Note :—Time allowed for each subject was 50 minutes.

—o—

Practical Needlework in Elementary Schools.

BY MISS J. W. WARREN,

Inspectress of Needlework to the Leicester School Board.

THIS being the standard in which practical mending is begun, it is essential that we consider not only the best way of doing the specimen, but also the most useful way of learning to mend. The two are not always identical, as all needlewomen will admit. The darning on stocking web is evidently for strengthening a thin place. This specimen will be much more effectually taught on *a large piece of the closed material*, answering to the leg of a stocking; it can be bought direct from the weaving rooms in this condition.

Mode of work.—Provide each girl with eight inches of stocking web, as above, and let her hem the top and bottom of it with tape, in the form of binding, this will keep it from curling up. The piece thus prepared, will last the year through, and will admit of 24 practice darns. The girls should be taught to draw the small stocking-leg piece over the left hand, and for the *second* lesson, make the darn near to one of the binders. When the *first* is done, the rest can be regulated as to position by it, and the progress can be marked by a difference in the colour of the mending angola. The third standard darn is to be done at the *first* lesson upon a square piece, just to get the girls used to the difference of material, but after the first, proceed with the hollow specimen piece. A girl should be taught to hold the supposed garment so that she uses the piece stretched between the first and second fingers, not loose, as so many children do hold it. The reason is obvious, directly the real stocking is held, the work has to be done over again if the above plan is not adopted.

Who that has taught this useful art has ever felt quite satisfied when putting it to the test of practice in a garment? Let your pupils darn from left to right, and later on, when dealing with a hole, the plan can be reversed if necessary. The thin place darn will be cleaner when worked from the left out of the way of the right hand. The stitches should be worked up and down, and care is needed to teach a child the row of loops to start upon; these should curve away from the opening of a stocking and towards the foot. It will be better for the teacher to get a piece of material and reason this out for herself. Try the effect of both ways and find that those loops curving up from the leg take the up thread without any displacement of surroundings, those curving down, the down thread in the same way. No bad darning can come after care in these small matters. Rucks in a plain darn are often due to this mistake alone. The specimen is to be irregular in shape, but it will be well to darn your square regularly first and to continue the work until the round specimen has a border of regular darning at the top. After which, squares of $\frac{3}{4}$ and $1\frac{1}{4}$ inches may be made separated by a thread or two the one from the other, the progress will by this plan be seen every time the work is taken out. Do not use too fine a needle, darners should take the thread quite easily to avoid drawing up the material. Nothing is better than mending angola or cotton; embroidery cotton or wool are quite unsuitable and should not be used in teaching.

The irregular darn can be made of any shape, but the usual diamond possesses the advantage of being more general and certainly more used in the case of ordinary hole darning. To begin this, one thread more is taken at top and bottom of each line until half the size required is reached, when a similar decrease must be made. A *wave* edge is obtained by increasing three rows and then decreasing, taking care to have two rows of the maximum at longest and shortest part of the darn. Now a word about the position of the hand—the two first fingers should be under the needle in working the up rows, and held as for hemming in the down, though of course the position from wrist is more elevated, naturally; the work should be brought under and towards the needle, *both hands should move* to get the work well done. The right and wrong sides of the web should be shown, and some threads pulled apart to demonstrate this part of your lesson; these loose threads should be a guide in the choice of thickness of mending thread, which should always be a little thicker, but never used double. *A plain darn* means one thread up, one down, and does not admit of the varieties found by varying the number of threads. This last kind of darn, however simple, is really a stocking web or a damask darn in contradistinction to plain. I mention this as I have found doubts exist as to the exact meaning. A plain darn can vary only in shape of its edges, not in the stitch itself, which is always the simplest. I hope next month to give a sketch of this, and the buttonhole, button, and flannel patch.

The flannel patch must now be considered, this is interesting work when carefully and thoroughly taught. The right side must first be found in all materials that do not show by pattern or colour, flannel belongs to this class and can be easily known by the fact that the right side has a fine downy surface, the wrong being free of hairs and showing more clearly the threads. As a matter of domestic interest girls should be taught to make garments up with the nap inside, as they are warmer so made, mentioning this will fix in their memory the fact of its possessing differing surfaces, which must be matched as carefully as the warp and weft.

Mode.—Give to each girl a piece of flannel, let her with shut eyes feel each side, this is often better than looking at it, but of course both methods can be used. When you have quite taught the right and wrong sides let your pupils measure each side upon a slate stretching them as much as possible, then compare the marks made and it will be found that two lines

are much longer than the remaining two, these indicate the sides from selvedge to selvedge, explain that the *patch piece* and *garment piece* must match in this, that to put the warp to the weft is to get a puckered patch. Some such plan takes from the monotony of the necessary details and lightens the teacher's work.

Now provide two pieces of flannel, one larger than the other, a five inch and a three inch will be found suitable for a start, from the beginning it will be well to call the larger your garment and the smaller your patch material, give every third or fourth girl a pair of scissors, or go round your class with a pair instead if you cannot provide them, but it is well to get them in this standard as they are wanted for *every specimen*. Now show children how to fold cornerwise, making four triangles, the protruding corner cut off will give the hole to be patched, and *should be cut by the girls at first*, not after some work has been done. This *garment piece* must now be placed on the desk with *right side touching desk* and selvedge side running in a line *with body of worker*.

Take up patch piece, fold as in other, but instead of cutting stick a pin in a thread of the projecting fold, you have now marked centre, let pupils find right side and warp side. When done it is to be placed right side on top, or wrong side, of garment piece that is left lying on the table, care must be taken to place centre to centre by means of pin and hole, this done the pin can be drawn out and the two pieces of flannel fixed lightly together above hole by inserting it. Now let pupils see that lying in front of them are the garment and patch wrong sides uppermost and quite ready for work, one more pin below the hole will keep the patch in position, while with a coloured thread the girls tack round each edge about eight threads inwards, and then the herringboning can be done, this should be on the wrong side first, that is the larger square or the only square at present to be seen as the other is made by cutting the hole.

I have elsewhere described the method to be adopted in turning corners—proportion of stitch and the like, the double material must be kept to the left of the worker and the threads taken up on the *garment piece* must be close to the patch line, the herringbone should be firmly tight, notice that in fastening off you do it on the patch thus avoiding its being seen; let your pupils take their stitches through in every case, it is stronger and better.

Now we will think the wrong side is done. Corners barred as in Standard III. sketch. Work can be turned right side uppermost and with thin end of scissors from hole to each corner, cut old material to within eight threads of repair, line of stitches seen, then fold back, the triangular flap, cut by a thread from corner to corner, and herringbone down neatly.

Teachers will do well to note that all three patches of the code requirements have some necessary work on the right side, but should point out to children that the invariable rule is to make such work as little as possible, hence *the smaller square* of herringbone. The smaller square of seaming occurs on the right side, though in two cases, print and calico patch, the right side is done first, in this under consideration we do the wrong side first. Next month button and hole will be shewn.

(To be continued.)

Certificate Examination, 1889.

Male Candidates.

SECOND YEAR.

Euclid.

(Three *hours allowed for this paper.*)

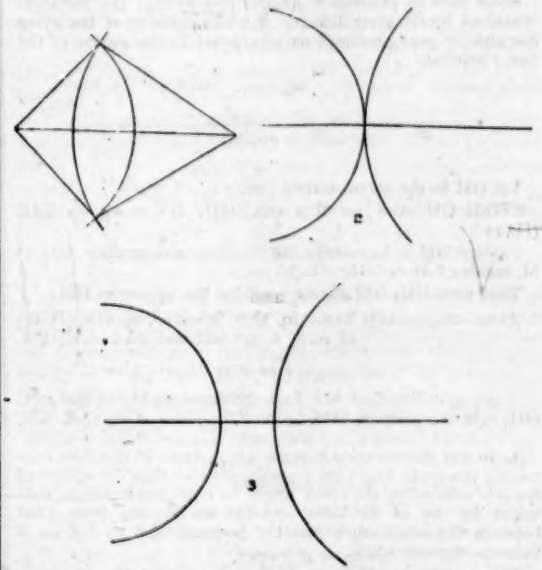
(Not more than EIGHT questions may be answered.)

N.B.—Capital letters (*excluding* A, B, C, D, E, F), not numbers, must be used in the diagrams

[All generally understood abbreviations and symbols for *words* may be used, but not symbols of operation, such as $-$, $+$, $\times$, PQ^2, PQ, RS.]

1. Construct a triangle whose sides are equal to three given straight lines, any two of which are together greater than the third.

Show by diagrams what will happen if you attempt to construct triangles whose sides contain units in the following relations:—(1.) 2, 3, 4; (2.) 2, 3, 5; (3.) 2, 3, 6.



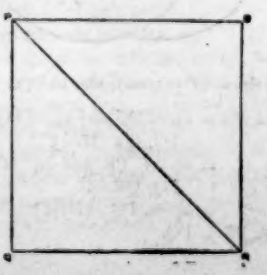
In (1) the circles described with radii of 2 and 3 units with the extremities of the line of 4 units as centres will cut one another, and therefore two triangles can be drawn.

In (2) when these circles are drawn with the extremities of the line of 5 units as centres they will meet on this line, and no triangle can be drawn.

In (3) when the extremities of the line of 6 units are the centres, the circles neither cut nor meet, and again a triangle cannot be drawn.

2. If a straight line falling on two other straight lines make the alternate angles equal to one another, or make the interior angles on one side together equal to two right angles, these two straight lines shall be parallel.

Show that a four-sided figure, which has all its sides equal and one angle a right angle, is a square.



Let PQRS be a four-sided figure, having all its sides equal, and the angle PQR a right angle.

Then PQRS is a square.

Proof.—Join PR.

In △s PQR, PSR,
Sides PQ, QR = sides PS, SR,
and base PR is common,
∴ ∠ PQR = ∠ PSR. (I. 8.)
Wherefore ∠ PSR is a right angle.
Again QP = QR.
∴ ∠ QPR = ∠ QRP,

Wherefore each of these angles = half a right angle; (I. 32.)

Similarly it can be proved that each of the angles SPR, SRP = half a right angle.

Wherefore ∠s QPS, QRS are right angles.

∴ PQRS is a square. (Def. 30.)

3. To divide a given straight line into two parts, so that the rectangle contained by the whole and one of the parts may be equal to the square of the other part.

Show how to produce a straight line so that the rectangle contained by the given line and the line made up of the given line and the part produced may be equal to the square of the part produced.

Let GH be the given straight line.

Divide GH in K, so that rect. GH, GK = sq. on KH. (II. 11.)

Produce GH to L, making HL = KH, and produce GL to M, making LM = GH. (I. 3.)

Then rect. GH, GM shall be equal to the square on HM.

Proof.—Sq. on HM = rect. KM, LM and sq. on HK (II. 6.)
= rect. KM, GH and rect. GH, GK (Con.)
= rect. GH, GM. (II. 1.)

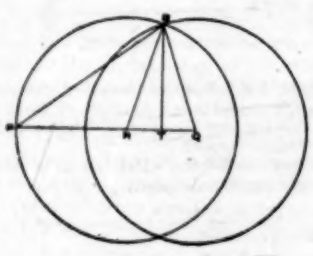
∴ Straight line GH has been produced to M, so that rect. GH, GM = square on HM. Q.E.F.

4. In any acute-angled triangle the squares of the sides containing the acute angle are together greater than the square of the side subtending the acute angle by twice the rectangle contained by one of the sides and the straight line intercepted between the acute angle and the perpendicular let fall on it from the opposite angle.

The straight line PQ is divided in R, so that the rectangle PQ, QR is equal to the square of PR.

Circles with centres Q, R, and radii equal to PR intersect in S.

Show that PQS is an isosceles triangle, having each of the angles PQS, PSQ double of QPS.



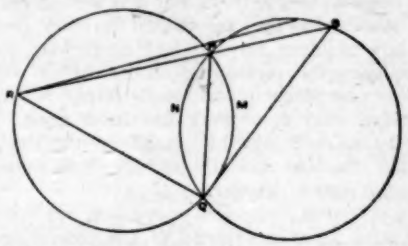
Join SR, and draw ST perpendicular to PQ.

Proof.—Sq. of PS = sq. of SQ and sq. of PQ less twice rect. PQ, QT (II. 13.)
= sq. of PR and sq. of PQ less rect. PQ, QR
= sq. on PQ; (Hyp.)
∴ PS = PQ.

Now RS = RP,
∴ ∠ RSP = ∠ RPS;
wherefore ∠ SRQ is double of SPQ, (I. 32)
and ∠ SQR = ∠ SRQ, (I. 5)
∴ ∠ PQS is double of ∠ SPQ;
and ∠ PSQ = ∠ PQS, (I. 5)
∴ △ PQS is isosceles. and each of the angles PQS, PSQ is double of the angle QPS. Q.E.D.

5. The angle at the centre of a circle is double of the angle at the circumference upon the same base, that is, upon the same part of the circumference.

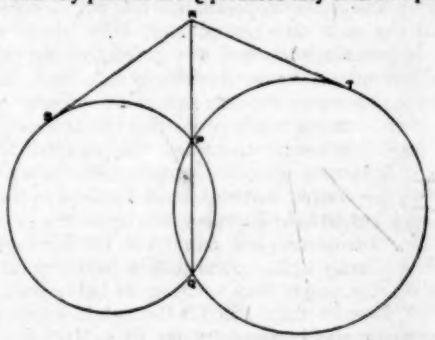
Two equal circles intersect in P, Q. Any straight line is drawn through P meeting the circles again in R, S. Show that if QR and QS be joined, QR is equal to QS.



Proof.—Join PQ.
Arc PMQ = arc PNQ, (III. 28.)
∴ ∠ PRQ = ∠ PSQ, (III. 27.)
Wherefore QR = QS. (I. 6.)

6. If from any point without a circle two straight lines be drawn, one of which cuts the circle, and the other touches it, the rectangle contained by the whole line which cuts the circle, and the part of it without the circle, shall be equal to the square on the line which touches it.

Two circles intersect in P, Q. If tangents be drawn to the circles from any point R in PQ produced they shall be equal.

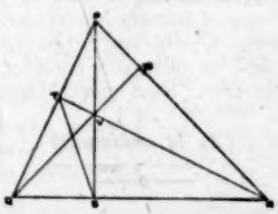


Produce QP to R, and draw the tangents RS, RT. (III. 17.)
Then RS shall be equal to RT,

Proof.—Square on RS = rect. QR, RP
and square on RT = " " } (III. 36.)
∴ square on RS = square on RT,
Wherefore RS = RT. Q.E.D.

7. In a circle, the angle in a semi-circle is a right angle; but the angle in a segment greater than a semicircle is less than a right angle and the angle in a segment less than a semicircle is less than a right angle.

PQR is a triangle, PS, RT, meeting in V, are drawn perpendicular to the opposite sides. QV is produced to meet PR in W. Show that QW is perpendicular to PR.



Proof.—Join TS.

The angles QTV, QSV are together equal to two right angles,

∴ A circle can be described about the quadrilateral QTVS (Converse of III. 22.)

∴ ∠ SQV = ∠ STV. (III. 21.)

In △s PSQ, RTQ,

∠ PSQ = ∠ RTQ, (Ax. 11)

and angle PQR is common to the two triangles,

∴ ∠ QPS = ∠ QRT. (I. 32.)

As the angle TPS = angle TRS, a circle can be described round the quadrilateral PTSR ; (Converse of III. 22)

∴ ∠ STR = ∠ SPR ; (III. 21.)

But ∠ STR = ∠ SQV,

∴ ∠ RQW = ∠ SPR, (Ax. 1.)

And angle at R is common to the two triangles RQW, SPR,

∴ ∠ QWR = ∠ PSR. (I. 32.)

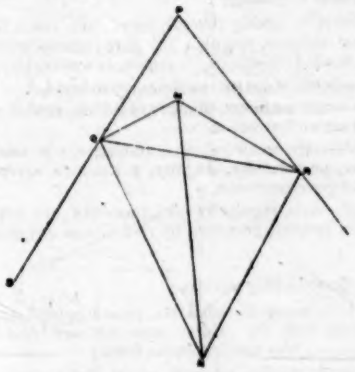
But ∠ PSR is a right angle,

∴ ∠ QWR is a right angle ;

Wherefore QW is perpendicular to PR. Q.E.D.

8. To inscribe a circle in a given triangle.

M is the centre of the circle inscribed in the triangle PQR; and N is the centre of the circle which touches PQ and PR produced and QR. Show that MN is the diameter of a circle which passes through Q and R.



Proof.—∠ MQR = half ∠ PQR,

∠ NQR = half ∠ SQR,

∴ ∠ MQN = half ∠s PQR, SQR,

Wherefore ∠ MQN is a right angle.

Similarly it can be proved that the angle MRN is a right angle.

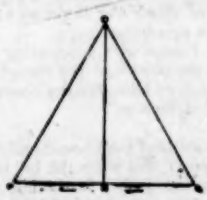
A circle can be described about the quadrilateral MQNR ; (Converse of III. 22.)

And as the angles MQN, MRN are right angles,

∴ MN is the diameter of the circle which passes through Q and R. (Converse of III. 31.) Q.E.D.

9. To inscribe an equilateral and equiangular hexagon in a given circle.

Compare the areas of regular hexagons inscribed in and described about a given circle.



Let POQ be an equilateral triangle.

Draw OR perpendicular to PQ.

Then OR = radius of inscribed circle of hexagon of which PQ is a side, and it is therefore also the side of the hexagon inscribed in this circle.

$$OR^2 = OP^2 - PR^2$$
$$= PQ^2 - (\tfrac{1}{2}PQ)^2$$
$$= PQ^2 - \tfrac{1}{4}PQ^2$$
$$= \tfrac{3}{4}PQ^2$$

$$\therefore OR = \frac{\sqrt{3}}{2} PQ.$$

Area of △ POQ = PR × OR

$$= \tfrac{1}{2}PQ \times \frac{\sqrt{3}}{2} PQ$$

$$= \frac{\sqrt{3}}{4} PQ^2 ;$$

$$\therefore \text{Area of hexagon of which the side is PQ} = \frac{\sqrt{3}}{4} PQ^2 \times 6$$

$$= \frac{3\sqrt{3}}{2} PQ^2.$$

$$\therefore \text{Area of hexagon of which the side is OR} = \frac{3\sqrt{3}}{2} OR^2.$$

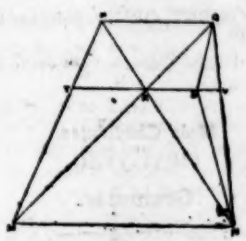
∴ Area of inscribed hexagon : Area of circumscribed hexagon

$$:: \frac{3\sqrt{3}}{2} OR^2 : \frac{3\sqrt{3}}{2} PQ^2$$
$$:: OR^2 : PQ^2$$
$$:: \tfrac{3}{4}PQ^2 : PQ^2$$
$$:: 3 : 4. \text{ Ans.}$$

N.B.—It could have been deduced at once from VI. 20.

10. If a straight line be drawn parallel to one of the sides of a triangle it shall cut the other sides, or these produced, proportionally ; and conversely, if the sides, or the sides produced, be cut proportionally, the straight line which joins the points of section shall be parallel to the remaining side of the triangle.

MNP, MNQ are equal triangles. MQ and NP intersect in R. Through R a straight line is drawn parallel to MN meeting MP in T and NQ in V. Show that TR is equal to RV.



Proof.—For if TR be not equal to RV, let RV be greater than TR, and make RS = TR. (I. 3.)

Join QS, NS.

Because △ MPN = △ MQN,

∴ PQ is parallel to MN ; (I. 39.)

Wherefore PQ and TV are parallel. (I. 30.)

Because △ MPN = △ MQN,

and △ MRN is common to both,

∴ △ PRM = △ QRN. (Ax. 3.)

Because TR = SR, (Con.)

∴ △ TRM = △ SRN
and △ TRP = △ SRQ } (I. 38.)

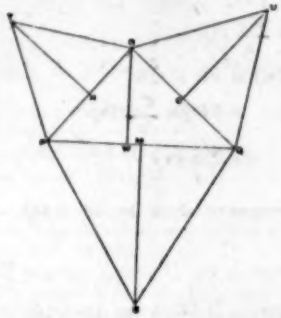
Wherefore △ PRM = △s SRN, SRQ,

∴ △s SRN, SRQ = △ QRN, which is impossible.

Wherefore TR and RV are not unequal, that is, TR is equal to RV. Q.E.D.

11. Equal triangles which have one angle of the one equal to one angle of the other, have their sides about the equal angles reciprocally proportional; and conversely, triangles which have one angle of the one equal to one angle of the other, and their sides about the equal angles reciprocally proportional, are equal to one another.

Prove that the equilateral triangle described on the hypotenuse of a right-angled triangle is equal to the sum of the equilateral triangles described on the other two sides. (VI. 16 may be used.)



Let PRQ be a right-angled triangle, having the right angle PRQ.

Upon the sides describe the equilateral triangles PQS, PRT, QRV.

Then the equilateral triangle PQS shall be equal to the equilateral triangles PRT, QRU.

Proof.—Draw the perpendiculars SM, TN, UO, and RW.

△s PRW, QRW, and PQR are similar,

∴ PQ : PR = PR : PW, (VI. 4)

But PQ : PR = PM : PN,

and PM : SM = PN : TN, (VI. 4,)

or PM : PN = SM : TN ; (V. 16.)

∴ SM : TN = PR : PW,

or rect. SM, PW = rect. TN, PR. (VI. 16.)

Similarly it can be proved that rect. SM, QW = rect. UO, QR ;

∴ rectangles SM, PW and SM, QW = rectangles TN, PR and UO, QR,

and rect. SM, PQ = rectangles SM, PW and SM, QW, (II. 1.)

Also triangles PQS, PRT, QRV are halves of these rectangles, respectively, (I. 41.)

∴ Equilateral triangle PQS = equilateral triangles PRT, QRU. Q.E.D.

Male Candidates.

FIRST YEAR.

Grammar.

1. *Write a short Essay upon 'Thoughts that arise on a first visit to Westminster Abbey.'*

When any one visits 'The Abbey,' especially for the first time, naturally the foremost idea that arises within the mind, and is suggested by the surroundings, is the vanity of human greatness, genius or fame.

Around in dull, cold marble lie the ashes of the mighty dead, but not all the recognition of a grateful nation was able to preserve their presence in the council chamber, the senate, the pulpit, or the tented field.

Death, the grim destroyer, the tenacious holder, has stricken down the revered ones of the people, and none could rescue and none can unclasp his grasp.

Of what avail are post-mortal honours?

'Can storied urn or animated bust
Back to its mansion call the fleeting breath?
Can Honour's voice provoke the silent dust,
Or Flattery soothe the dull cold ear of death?'

Yet there are nobler thoughts than these. We stand amid the remains of men who fulfilled the expectation of their country, and who did their duty.

Poets, divines, patriots, who have sung, exhorted and bled, lie on all sides.

Many of them were singled out by no advantages of fortune, but by inward inspiration and self-denial; and one cannot help feeling that their blest spirits must look down with a paternal care and pleasure upon the fatherland which their devotion freed, saved and adorned.

2. *Parse the words in italics in the following passages:—*

(*a*) 'The applause of listening senates *to command*,
The *threats* of pain and *ruin* to despise,
To scatter plenty o'er a smiling land,
And read *their* history in a nation's eyes,
Their *lot forbade:* nor circumscribed *alone*
Their growing *virtues*, but their crimes *confined*,
Forbade to wade through slaughter to a throne
And *shut* the gates of mercy on mankind.'

(*b*) '*There be that can packe* cards *and yet* cannot *play well.*'

(*a*)

to-command—verb, weak (regular) trans., act. voice, infin., present, governs *applause* and governed by *forbade.*

threats—common noun, plural, 3rd pers., neuter, objective, governed by *to despise.*

ruin—common noun, singular, 3rd pers., neuter, objective, governed by *of.*

their—personal pronoun, plural, 3rd person, common gend., possessive, qualifies *history.*

lot—common noun, singular, 3rd person, neuter, nominative, subject to *forbade.*

forbade—verb, strong (irreg.), trans., act. voice, indicative, past definite, singular, 3rd pers., agrees with *lot* and governs *to command, to despise, to scatter,* [*to*] *read.*

alone—adverb of extent, modifies *circumscribed.*

virtues—common noun, plural, 3rd person, neuter, objective, governed by *circumscribed.*

confined—verb, weak (regular), transitive, act. voice, indicative, past definite, singular, 3rd person, agrees with *lot* and governs *crimes.*

[*to*] *shut*—verb, regular (weak), transitive, act. voice, infinitive, present, governed by *forbade* and governs *gates.*

(*b*)

There—introductory adverb.

be—verb, substantive, indicative, present, plural, 3rd person, agrees with the subject noun sentence '*that can packe .....play well*' (archaic form.)

that—simple relative pronoun, plural, 3rd person, common gend., nominative, subject to *can* and *cannot.* [The antecedent is not expressed but the number and person are manifest.]

can—verb, strong (irreg.), trans., act. voice, indicative, present, plural, 3rd person, agrees with *that* and governs *packe.*

packe—verb, weak (regular), transitive, act. voice, infinitive, present, governed by *can* and governs *cards.*

and—conjunction, copulative, joins two co-ordinate sentences '*can packe,*' etc. and '*cannot play.*'

yet—conjunction, adversative, joins two co-ordinate sentences '*can packe,*' etc. and '*cannot play.*'

play—verb, weak (regular), transitive, act. voice, infinitive, present, governed by *cannot* and governs [*them*].

well—adverb of manner, modifies *play.*

3. *Analyse fully the following passages:—*

(*a*) 'Mark the year and mark the night
When Severn shall re-echo with affright
The shrieks of death o'er Berkeley's roof that ring,
Shrieks of an agonising king!
She-wolf of France with unrelenting fangs
That tear'st the bowels of thy mangled mate,
From thee be born who o'er thy country hangs
The scourge of heaven.'

(*b*) 'The people assembled; Mahomet called the hill to come to him again and again; and when the hill stood still, he was never a whit abashed, but said, "If the hill will not come to Mahomet, Mahomet will go to the hill."'

SENTENCE.	KIND OF SENTENCE.	CONNECTIVE	SUBJECT.		PREDICATE.		OBJECT.	
			SIMPLE	ENLARGEMENT.	SIMPLE.	EXTENSION.	SIMPLE.	ENLARGEMENT.
A Mark the year and mark..... .....ring	Principal	...	[You]	...	mark	...	year night	the the when Severn..... .....ring.....king
A2 When Severn shall re-echo .....king	Adjective Qual. year and night	when	Severn	...	shall re-echo	with affright	shrieks	the of death o'er Berkeley's roofs .....ring.....king
A3 o'er Berkley's roofs that ring	Adjective Qual. shrieks	(that)	that	...	ring	o'er Berkley's roofs		
B She-wolf of France ...unrelenting fangs ... .mate	Adjective Qual. wolf	She-wolf of France = Nominative ...	that	...	of Address. tearest	with unrelenting fangs	bowels	the of thy mangled mate
C From thee be born who... .....heaven	Principal	...	who o'er thy country hangs the .....heaven	...	be born	from thee		
C2 Who o'er thy country hangs the scourge of heaven	Adjective used as a noun subject to C	(who)	who	...	hangs	o'er thy country	scourge	the of heaven
(*b*) A The people assembled	Principal	...	people	the	assembled			
B Mahomet called the hill....again	Principal	...	Mahomet	...	called	again and again	hill to come	the to him
C And when the hill..... .....abashed	Principal	and	he	...	was abashed	never a whit when the hill .....still		
C2 When the hill stood still	Adverb Mod. was abashed	when	hill	the	stood	still		
D but said, if the hill will not.....hill	Principal	but	[he]	...	said	...	if the hill .....hill	
D2 if the hill will .....hill	Noun Governed by said	if	Mahomet	...	will go	to the hill if the hill will...Mahomet		
D2*a* if the hill .....Mahomet	Adverb Mod. will go	...	hill	the	will come	not to Mahomet		

4. *Write such notes as you think needful on the following passages:—*

(*a*) Ye towers of Julius, London's lasting shame,
With many a foul and midnight murder fed,
Revere his consort's faith, his father's fame,
And spare the meek usurper's holy head.

(*b*) Their feather-cinctured chiefs and dusky loves.

(*c*) Who foremost now delight to cleave
With pliant arm thy glassy wave?
The captive linnet which enthral?

(*d*) The Attic warbler pours her throat,
Responsive to the cuckoo's note.

(*e*) To heap the shrine of luxury and pride
With incense kindled at the Muse's flame.

(*a*) *Towers of Julius.*—Tower of London erroneously supposed to have been commenced by Julius Cæsar. Margaret was the exceedingly faithful wife of Henry VI.; his father was Henry V., famed for his exploits in France. Henry Bolingbroke was according to primogeniture a usurper, and so also were Henry V. and VI.

(*b*) Chiefs decorated with chaplets of feathers—brown or red faced spouses—*feather-cinctured* is a compound participle in Gray's own style.

(*c*) In accordance with Middle English usage both *who* and *which* are here used for persons; *to cleave* is a good instance of an infinitive governing and being governed; *captive*, the captive linnet is already enthralled. This usage probably arose through the lack of a future participle in English. The first two lines refer to boat racing, not swimming.

(*d*) According to the classical myth, Philomela, daughter of Pandion, king of Attica, was metamorphosed into a nightingale; *pours her throat* equals emits floods of song.

(*e*) To offer the flattery of poetry to the pampered and vain. Immortal authors have in Dr. Johnson's time written fulsome dedications of their works to unworthy persons in order to catch a stray guinea.

5. *Discuss the structure and derivation of the following words:* inevitable, confederation, atheism, discontentments, democracies, abbreviate, regal, symphonious, annals, afield.

inevitable, *in* = not, *evito* = *devito* = I shun, *able* = capable, not capable of being shunned (L.). *able* has changed in many words from active to passive, thus *colourable* meant able to colour.

confederation—*con* = together, *foederatus* = leagued together, *-tion* = state of (L.).

atheism—*a* = not, *theos* = God, *-ism* = state of (Gr.).

discontentments—*dis* = not, *con* = together, *teneo* = I hold, *-ment* = state of (L.). *Discontentment* is abstract, *discontentments* is concrete.

democracies—*demos* = people, *crateo* = I am strong, *-y* = state of (Gr.). Another instance of a singular abstract forming a plural concrete.

abbreviate — *ab* = from, *brevis* = short, *-ate*, a verbal suffix (L.).

regal—*regalis* = kingly (L.).

symphonious—*sym* = *sun* = together, —*phonos* = a sound *-ious*, adjective suffix (Gr.).

annals—*annus* = a year (L.).

afield—*a* = on. Compare '*a-dying*' '*aboard*' (Teutonic).

The roots of some of the above words are themselves derivatives, as *devito* = de and vito; *foederatus* from *foedus* = a treaty; *evito* further has suffered truncation, and *sun* is converted into *sym*.

6. '*Gay hope is theirs by fancy fed,*
Less pleasing when possest.'

In analysing and parsing this sentence with the Sixth and Seventh Standards, what difficulties will the children find? How shall you clear them away?

DIFFICULTIES:

(1) The inverted order of the couplet.

(2) Having a copulative verb for part of predicate.

(3) The word *theirs*—is it a possessive case, or a possessive pronoun?

(4) The participles *fed*, *pleasing*, *possest* always puzzle children as to what nouns they qualify.

EXPLANATIONS:

(1) Place the couplet in prose order, viz., '*Gay hope, fed by fancy, pleasing less when possest is theirs.*'

(2) Show that a copulative verb with its complementary subject is equivalent to an ordinary assertive verb, *e.g.*, *The fire is alight* = The fire burns; *Gay hope is theirs* is a passive form of 'They possess gay hope.'

(3) *Theirs* cannot be a possessive case, as it is the subject after *is*.

(4) Call attention to the fact that *hope* is *fed* hope, *pleasing* hope, *possest* hope. Give other instances where the participle is used before the noun.

7. *Give three examples (if possible, from your specified books) of each of the following:—Collective noun, nominative absolute, subjunctive mood, disjunctive conjunction, and noun in apposition.*

Collective Noun.

crowd, 'How vain the ardour of the crowd!'
herds, 'The panting herds repose.'
man, 'Such is the race of man.'

Nominative absolute.

youth, 'In gallant trim the gilded vessel goes, *youth* on the prow.'
Religion, '*Religion* being the chief band of human society, it is a happy thing,' etc.
face, 'Her awe-commanding *face*, attempered sweet,' etc.

Subjunctive Mood.

'Though the sects *be* gone,' etc.
'If he *have* but his finger's end pressed,' etc.
'If it *come* so to pass.'

Disjunctive Conjunction.

'*Though* the sects be gone,' etc.
'*But* we may not take up the third sword.'
'*Yet* the spirit of Job was in a better tune.'

Noun in Apposition.

'Lo where the rosy-bosomed hours, fair Venus' *train*.'
'My careless childhood strayed, a *stranger*.'
'Virtue, his darling *child*.'

8. *Prepare the outline of a* FIRST *lesson on the Preposition.*

1. There are various relations (such as *position*), which one thing may bear to another. Show by actual objects, and by blackboard diagrams a few relative positions, such as being above, below, within, around, near, from, etc.

2. One of the objects is the standard of position, with respect to which the location of the other is predicated, *e.g.*, The egg is *above*, *below*, *within*, *around*, *near* the box as the case may be.

Here the italicised words are all prepositions and define the position of the egg relative to the box. *Box* is said to be governed by the preposition.

3. The preposition must be distinguished from the adverb. This may be done by pointing out that the preposition governs a noun or its equivalent, but that the adverb does not, *e.g.*, 'Go down,' 'Go down the pit.' In the first instance *down* is an adverb, in the second a preposition.

4. After suitable exercises the scholars will find that the preposition nearly always precedes its governed noun. Hence comes its name, the derivation of which should be given.

N.B.—This is quite enough for one lesson. The other relations expressed by prepositions, the difference between prepositions and conjunctions, the fact that prepositional phrases are either in function adverbial or adjectival, should be reserved for subsequent lessons.

Domestic Economy.

FIRST YEAR.

1. State the arguments for and against a purely vegetable diet.

Diet, food for the human body, should be such as to furnish materials for—

1. Keeping up the natural warmth.
2. Producing strength.
3. Replacing daily waste and building up the frame.
4. Antiscorbutics and blood purifying substances.

Some vegetable foods contain, *but in small proportions*, the materials supplying all the above requirements. In the Torrid Zone a vegetable diet is the most suitable, as the natural bodily heat is assisted by the climate, and is not so necessary in the food. A purely vegetable diet is not sufficient in our own climate. The nutriment contained is often condensed and difficult of digestion. Neither flesh nor vegetables contain apart the proper constituents of a true food in proportionate and accessible form.

The constitution of man as to teeth, stomach, and intestines, shows him to be partly carnivorous and partly herbivorous.

The human appetite demands variety, and sameness of diet produces disgust and nausea.

Food then should consist of a duly proportioned diet of vegetable and animal substances.

In the Frigid Zone it would be practically impossible to live on a purely vegetable diet, as not enough heat giving elements could be assimilated.

2. What kinds of food are best adapted to (1) hot; (2) cold and (3) temperate climates?

(1) *In hot countries*, the internal warmth of the body is often exceeded and therefore often requires reducing, instead of feeding.

Cooling fruits and vegetables, rice and milk, and other foods not containing heat-producing and strength-giving materials, are therefore the best.

(2) *In cold Countries*, animal and all kinds of stimulating foods are required to supply heat and strength to the persons who must obtain their living among the rocks and frozen regions.

(3) The above extremes teach, that in temperate climates a mixed food is necessary and that it should in summer approximate to that of inhabitants of the Torrid Zone, and in winter to that of the people in the Frigid Zone.

Therefore in hot countries, rice, maize, fruit, and vegetables of all kinds; in cold countries, flesh, fish, &c., and in temperate climates, such as our own, the greatest variety of meat, vegetables, and fruits should be recommended as most suitable.

3. Explain the process of mastication and describe the common causes of indigestion.

Mastication is the act of grinding, breaking and crushing our food into small pieces. Whatever kind of food is taken into the system, it must all be absorbed by, and be changed into blood. In order that this may take place, the food requires to be pulped before entering the system. Accordingly, the teeth break it up and grind it—the saliva moistens, softens, and prepares it for chemical changes, and the tongue conducts it to the throat ready for swallowing and subsequent digesting.

Indigestion may be caused—

(1) By *improper mastication*. Children especially are liable to swallow their food in large portions, this will cause indigestion and with young children fits and worse results. Older persons sometimes suffer from indigestion through imperfect mastication when their teeth are few or decayed.

(2) By swallowing indigestible and unwholesome food.

(3) When any one or more of the masticating and digestive organs (through cold or other causes) is impaired and cannot perform its share in the preparation of the food for the fluid state,

(4) All disorders of the system and even mental anxiety, react upon the stomach and cause feebleness, and consequent indigestion, doubtless through the diversion of energy into other channels.

4. What evil results from an excessive use of tea and coffee?

Tea and coffee have by some been wholly condemned as enervating slops, but it is only excessive use of these beverages which causes them to be injurious. The action of tea upon the human body is more powerful than that of any substance not used as medicine, except tobacco and spirits. The valuable ingredient in the composition of tea, namely, theine, possesses nutriment of a peculiar restorative kind and pleasantly excites the nervous system, increases respiration and action of the skin, and tends to quicken digestion; but when taken in excess it over stimulates, causing watchfulness and want of sleep, and in some constitutions the most distressing effects. Tea is also a mild narcotic when used properly, but like all other narcotics should be taken sparingly, or it will cause after-depression, languor, and a feeling of misery. The colouring of tea is owing to the presence of tannin, which causes the tea to disagree with persons of weak digestion by affecting the stomachic coating. Ill-fed and spare people, and the young, suffer from the use of tea if taken after the absence of food. Coffee has the same effects upon the system as tea, but is more stimulating.

5. Distinguish the different materials used for clothing as conductors or non-conductors of heat.

The clothing materials used for summer wear, which allow the heat of the body to pass through and so keep the body cool, are called good conductors. Under this head we have—

1. Linen, including damask, diaper, lawn, cambric, huckaback, &c.

2. Cotton, including prints, sateens, calico (grey and white).

Materials which keep in the heat of the body, and so are required for winter clothing, are called non-conductors. These are:—

1. Wool, including merinos, cashmeres, serges, flannels, cloth.
2. Silk.
3. Fur, and the skins of animals.
4. Leather, for boots and shoes.

Cotton, calico and print are really medium conductors of heat, being less conducting than linen, and more conducting than woollen. The colours of materials affect the conducting properties of the clothing, black and other dark colours absorb the heat of the sun and thus contribute to the bodily warmth. White and other light colours reflect the sun's rays and so keep its heat from the body.

6. Give some hints as to a pupil teacher on the subject of cheap clothing with reference to wear and cleansing.

Cheap clothing, is, as a rule, expensive clothing, if by this we mean low-priced clothing. In the purchase of clothing it should be borne in mind that 'the best is the cheapest,' because independent of the want of substance and consequently warmth in cheap clothing, it wears out with so much greater rapidity and therefore eventually is much dearer, neither will cheap articles as a rule wash well both as regards colour and fabric.

(1) *Wear.*—In order that clothes may wear well it is not always necessary to give a high price.

Good silks and satins may be too expensive to wear, then do not choose silks, or imitations, but rather select other materials as cashmeres, serges, beiges, &c., which will wear better and cost much less money. The cheapest, because most durable, kinds of clothing then are woollens, alpacas, prints, knitted woollen stockings, knitted vests, hand made boots if possible (for though rather high-priced they last much longer), ordinary calico not too fine. Mixed goods are not durable, as the materials of which they are composed do not wear equally.

(2) *Cleansing.*—Teachers require materials which will wash easily and without shrinking, as they are exposed to much dust and contact with the children. The above materials are suitable for this purpose as the serge, cashmere, etc., will dye or clean well if pure wool, the knitted woollen articles will not shrink so much as flannel and bought stockings. Brown holland is a good material for washing-dresses as it does not require so much getting up as print.

7. What is meant by jerry-building? Name the defects and dangers of such a mode of constructing houses.

Jerry-building is a generic and comprehensive term for all constructing of edifices wherein cheapness and appearance, but not health and comfort, are the main objects.

Accordingly all things out of sight are neglected, all things demanding outlay without recompensing by an adequate show are disregarded.

The foundations are often insecure and laid without concrete upon damp soil, proper precautions being omitted, the drains are positively sometimes totally absent or without sufficient fall, calibre or directness of course, and the gas-pipes with depressions and leaks.

The materials employed are occasionally rotten, foul, deficient in quality or quantity or already contaminated.

The position of the offices is at times unhealthy in the extreme, ventilation is neglected, draughts are contemned, lighting and colouring are of the cheapest and showiest.

Accordingly rheumatism from the damp, blood-poisoning and fevers from sewer and illuminating gas, nausea from disgusting materials and the proximity of rejected products, colds from air currents, lack of vitality from defective light, and accidents from collapse of flimsy constructions are all to be dreaded. This picture is not overdrawn.

8. Give the principal rules for keeping a dwelling in cleanliness, healthiness and comfort.

The first of these divisions—cleanliness—is essential to the securing the other two.

The best way to ensure cleanliness in the house is to strictly and methodically '*keep clean things when they are clean*,' as opposed to doing little all the week and then having a general upset at the week's end. If people go through their work regularly, dividing it for each day, then the part of the house not undergoing cleaning will be orderly. Dust and dirt should be removed each day, an accumulation is more difficult to remove; care should be taken when cleaning and carrying things about to avoid slops, splashes and footmarks. All accidents of this kind should receive immediate attention.

Crockery should be washed as quickly as possible after use; as well as being the most tidy way, it is much easier to remove the dirt at once.

Once a week, on its own particular day, each room will require thorough sweeping, cleaning and dusting. Passages and windows must be cleaned, carpets shaken, pots and pans brightened, and any outside stonework, &c., will require attention.

Sinks and drains must be flushed repeatedly, and stoves and grates kept free from ashes and soot, or they will cause smoke and dust, which will affect the whole house.

To ensure the *healthiness* of a house, keep it strictly clean, well ventilated, beds regularly turned and left open to air; remove all slops as early in the morning as possible, use chloride of lime or carbolic soap in scrubbing, have regular, suitable times of white-washing, and keep the outside clear of refuse and rubbish of every kind.

To ensure *comfort*, in addition to cleanliness, everything should be neatly and tidily arranged. There should be 'a place for everything, and everything in its place.' Each room should be used and not kept for ornament. In winter the draughts should be well attended to and good fires kept up. To make the house comfortable all work should commence early and be disposed of as soon in the day as possible, whilst the bread winners are absent.

9. Explain the effects on the body of wearing damp or wet boots or clothing.

The body to be in a natural and healthy state must be kept very near 98 degrees. Should this heat receive a sudden check, a rush of blood is determined to some internal organ, interfering with its work and causing inflammation. In order to keep this uniform temperature of the body, which oftentimes becomes over-heated, the skin, by increase of perspiration, carries off any excess of heat. Perspiration, as well as regulating the heat of the body, serves the further purpose of an outlet to the constitution, by which it gets rid of substances no longer useful in its economy. If insensible perspiration is checked, injurious matter is retained. When damp clothes remain on the body, this chill and check of perspiration will take place, closing the pores of the skin and checking the circulation of the blood in the capillary vessels. This will cause inflammation of some or other of the respiratory organs. The effects resulting may be, a simple cold, catarrh, or cold in the head, sore throat, ulcerated throat, bronchitis, pleurisy, fever and rheumatism.

The intensity of the effect is greatly dependent on the constitution of the individual, and the state of health at the time when the chill takes place.

Cold feet (which of course are often the result of damp boots) are especially to be avoided.

10. When and how does air cease to be 'fresh'? Explain clearly the effects of a poisoned atmosphere.

(1) Pure air contains

Nitrogen	.....to the extent of	79·02	per cent.
Oxygen	..... " "	20·94	"
Carbonic Acid	" "	·04	"
		100	

Expired air contains

Nitrogen	.....to the extent of	79·3	per cent.
Oxygen	..... " "	15·4	"
Carbonic Acid	" "	4·3	"
		99	
	Loss per cent.	1	
		100	

These figures show that after the air has been breathed there is a large excess of carbonic acid gas. The air ceases to be 'fresh' when it has been repeatedly breathed and changed in the manner stated above.

Decaying animal and vegetable matter impregnates and pollutes the atmosphere by the particles which float about and cause a bad odour. The burning of gas, coals, oil, &c., also exhausts the oxygen of the air and generates carbonic acid.

(2) Pure blood is conveyed from the heart by the arteries to every part of the body, and when it has performed its work it has become sadly polluted. The veins then take this impure blood back to the heart, which sends it to the lungs to be purified. The fresh pure air taken into the body cleanses the impure blood and sends it back again to do its work.

The effect of a poisoned atmosphere is sometimes death, as in the case of the Black Hole of Calcutta.

When the impure air is breathed by the lungs, the blood, instead of being purified, is further tainted, causing typhoid fever, diphtheria, and other blood-poisoning diseases.

Air that is only slightly poisoned causes sleepiness and lassitude, dulness and depression of spirits, and loss of power in general.

11. What is said to be the 'line of comfort' with regard to the temperature of a room? Describe the means of diffusing artificial heat.

(*a*) The temperature most agreeable to persons not engaged in any exercise is 63° to 65° Fahrenheit. In school-rooms, where every one is busy and the air warmed by respiration, 60° is the 'line of comfort.'

(*b*) The most general mode of diffusing artificial heat in the home is by the open fire-grate in which coals are burnt. Asbestos arrangements and asbestos stoves are largely used, but they should be so fixed as to allow of the gas with which they are connected having its fumes conveyed out of the room into the chimney or some other outlet.

Oil lamps are also used for warming small rooms.

Stoves, which consume coal or coke are used both in small and large rooms.

For schools and other large buildings, the most general method of heating is by an arrangement of pipes round the room, which are supplied with hot air, hot water or steam, and thus a general heat is diffused equally all over the room.

Wenham and Water's hot water apparatus, Doulton's slow combustion stoves, Arnot's stoves, Edward's stoves, Brown and Green's stoves, Hopper stoves, centre grate stoves, &c., are all specimens of heating apparatus used in different hospitals, schools, and other like buildings.

12. Name the most effective ways of ventilating, (1) a school-room, (2) a bed-room.

(1) The measures for ventilating a school-room must be in conformity with the principles adopted for *warming* and *lighting* the school.

The windows may be utilised for *outlets;* they are the best means that can be used for this purpose. They should be arranged so that warm air may always escape when the school is at work. They should only be employed as *inlets* when the air out of doors is above 50°. In cold seasons the admitted air should be warmed air. The best principle is a combination of Tobin's tubes enclosing a set of Bunsen's burners. These burners are fitted to the bottom of the tube, but able to obtain the air for their own purposes from the school-room. This air after use must be conveyed through a smaller tube (containing asbestos) directly out of doors, not into the school-room. The asbestos is for retaining heat to warm the air in the casing. The pipe conveying the products of combustion into the outer air should be enclosed in the Tobin's tube, which brings fresh air from without into the room, and warms it on its progress up the tube.

The warmed but fresh air may be diffused at all the corners or recesses in the room into which the pipes can be fitted. They should open into the room about three feet from the floor.

(2) A bed-room when weather is suitable should have windows open top and bottom most of the day. A fire-place with chimney is a good ventilator. A valve in the chimney near the ceiling, so arranged that the foul ascending air will open it and pass out, but that it will shut up and refuse a down or inward draught, is excellent. A small sash of glass let in the wall over the bed-room door and kept open all night is an efficient ventilator.

In the absence of other ventilators the bed-room windows should be opened at the top during the night.

(To be continued.)

Query Column.

RULES.

1. **Each correspondent is restricted to *one question*.** We should be much obliged if correspondents, who send questions for solution, would give (if possible) the required answer, and the source from which the question is obtained.

2. No query can be answered unless accompanied by the real name and address of the sender, not necessarily for publication, but as a guarantee of good faith and for facility of reference.

3. ☞ **When a pseudonym is adopted it should be written at the end of the query, and the real name and address on a separate piece of paper.**

4. Correspondents are requested to write their queries *legibly*, and on one side of the paper only.

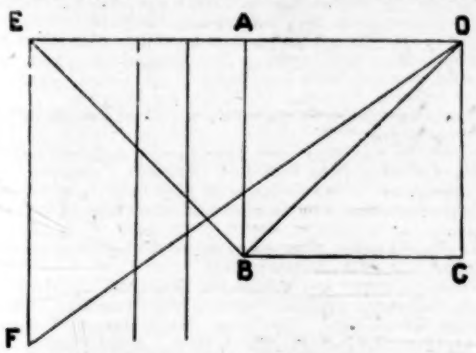
5. Replies will not be sent through the post.

6. Queries must reach the office *not later than the 12th of the month*, or they cannot be attended to in the following issue.

*** All communications for this column should be addressed—'*The Query Editor*,' *The Practical Teacher, Pilgrim Street, Ludgate Hill, London, E.C.*

Trigonometry.

1. REDNAXELA.—A building on a square base ABCD has two of its sides AB and CD parallel to the bank of a river. An observer standing at E on the other side of the river, so that DAE is a straight line, finds that AB subtends at his eye an angle of 45°. Having walked a yard parallel to the bank he finds that DE subtends an angle whose tangent is $\sqrt{2}$. Show that DB = a yard. (*Lock's* 'Elementary Trigonometry.')



Let F be the second position of the observer.

$\angle AEB = 45°$,

$\therefore \angle ABE = 45°$,

wherefore AB = AE,

and DE = twice AB.

$$\text{Tan EFD} = \frac{ED}{EF},$$

$$\angle 2 = \frac{ED}{1 \text{ yard}}.$$

$\therefore$ ED = $\sqrt{2}$ yards.

$$DB^2 = 2AB^2$$

$$= 2\left(\frac{\sqrt{2}}{2}\right)^2 \text{ sq. yds.}$$

$$= 1 \text{ sq. yd.}$$

$\therefore$ DB = 1 yard. Ans.

General.

1. PUZZLED.—As logs. cannot be given exactly, it is impossible to obtain the correct answer by that method. Your method is correct, and is sufficient for all practical purposes.

The *correct* answer can be obtained by raising 1·03 to the 1850th power, and calling the result pence.

$1850 = 2 \times 5^2 \times 37$,

$\therefore (1{\cdot}03)^{1850} = 1{\cdot}03^2 \times 1{\cdot}03^5 \times 1{\cdot}03^{37} \times 1{\cdot}03^{37}$.

You will understand that we cannot devote space nor time to this tedious work, but you will find you will obtain the correct result if you wish to take the trouble to solve the question by this method.

2. NOMAN'S LAND.—You will notice that your query was sent by another correspondent.

3. SCHOLARSHIP.—We hope to reply to your query in our next issue.

4. C. ROBINS.—(1) Model Drawing on the Blackboard. (2) Shading from Casts or Models.

5. KIOTO.—A 'First' in Perspective.

Algebra.

1. JUNIPER JUNKS.—Solve:—

$$\sqrt[2pq]{x^{p+q}} - \frac{1}{2c}(\sqrt[p]{x} + \sqrt[q]{x}) = 0. \qquad (Tedhunter.)$$

$$\sqrt[2pq]{x^{p+q}} = \frac{1}{2c}(\sqrt[p]{x} + \sqrt[q]{x}) = 0$$

$$x^{\frac{p+q}{2pq}} - \frac{1}{2c}(x^{\frac{1}{p}} + x^{\frac{1}{q}}) = 0$$

Divide by $x^{\frac{1}{q}}$]

$$x^{\frac{q-p}{2pq}} - \frac{1}{2c}(x^{\frac{q-p}{pq}} + 1) = 0$$

$$2cx^{\frac{q-p}{2pq}} - x^{\frac{q-p}{pq}} - 1 = 0$$

$$x^{\frac{q-p}{pq}} - 2cx^{\frac{q-p}{2pq}} = -1$$

Completing the square]

$$x^{\frac{q-p}{pq}} - 2cx^{\frac{q-p}{2pq}} + c^2 = c^2 - 1$$

Extracting square root]

$$x^{\frac{q-p}{2pq}} - c = \pm\sqrt{c^2 - 1}$$

$$x^{\frac{q-p}{2pq}} = c \pm \sqrt{c^2 - 1}$$

$$\therefore x = \left\{c \pm \sqrt{c^2 - 1}\right\}^{\frac{2pq}{q-p}}$$

The equation is also satisfied by $x = 0$.

Arithmetic.

1. HEBERTUS.—If I buy some oranges at 1s. 4d. for a score, and five times as many more at 1s. 3d. per score, and realise £1 7s. profit by selling the whole of them at 10d. per dozen, how many did I buy?

(*Naval Cadet Exam. Papers, June*, 1890.)

Cost of 1 score at 1s. 4d. = 16 d.

" 5 " 1s. 3d. = 75 d.

91 d.

Selling price of 6 score ot 10d. per dozen = 10d. × 10 = 100d.,

Gain = 100d. − 91d.

= 9d.

d. £ s. score

$\therefore$ 9 : 1 7 :: 1 : number at first price.

20

27

3

= 36 score at 1s. 4d.

and 180 " 1s. 3d. } Ans.

2. JOSEPHUS.—A snail creeps 2·583$\frac{1}{3}$ feet up a pole in 12 hours of night, and slips down 1$\frac{1}{3}$ feet in 12 hours of day; what length of time will it take him to get to the top of a pole 7 feet high? (*Blackie's* 'Seventh Standard Arithmetic.')

$$2{\cdot}583\tfrac{1}{3} = 2\frac{583 - 58}{900} = 2\tfrac{525}{900} = 2\tfrac{7}{12}.$$

The snail advances $(2\frac{7}{12} - 1\frac{1}{3})$ ft. or $1\frac{1}{4}$ ft. in every 24 hours, except for the part left after the last day;

$$7 \text{ ft.} \div 1\tfrac{1}{4} \text{ ft.} = \frac{7 \times 4}{5} = 5\tfrac{3}{5}.$$

As the snail creeps up $2\frac{7}{12}$ ft. during the night.

$\therefore$ $(1\frac{1}{4}$ ft. $\times 1\frac{1}{4})$ or $(\frac{5}{4} \times \frac{5}{4})$ ft. or 2 ft. remain after 4 days;

Time to creep up the last 2 ft. $= \frac{2 \text{ ft.}}{2\frac{7}{12} \text{ ft.}}$ of 12 hrs.

$= \frac{24}{31}$ of 12 hrs.

$= \frac{288}{31}$ hrs.

$= 9\frac{9}{31}$ hrs.;

$\therefore$ Total time $= 4$ days $9\frac{9}{31}$ hrs.

$= 105\frac{9}{31}$ hrs. Ans.

3. HERBERTUS.—3 boys and 5 girls eat 29$\frac{3}{4}$ lbs. of meat per week, and 3 men and 5 women eat 47$\frac{1}{2}$ lbs. If 3 men eat as much as 5 boys, and 2 women as much as 3 girls, find how much a boy and a girl respectively eat per day.

(*Naval Cadet Exam. Papers*, 1890.)

3 men and 5 women eat 47$\frac{1}{2}$ lbs.,
$\therefore$ 5 boys and 3 girls eat 47$\frac{1}{2}$ lbs.,
10 boys and 15 girls eat 94$\frac{1}{2}$ lbs.,
But 3 boys and 5 girls eat 29$\frac{3}{4}$ lbs.,
Or 9 boys and 15 girls eat 89$\frac{1}{4}$ lbs.,
$\therefore$ A boy eats $(94\frac{1}{2} - 89\frac{1}{4})$ lbs. per week

$= 5\frac{1}{4}$ lbs. per week.

$= \frac{3}{4}$ lb. per day. Ans.

3 boys and 5 girls eat 29$\frac{3}{4}$ lbs.
5 girls eat 29$\frac{3}{4}$ lbs. $- (5\frac{1}{4}$ lbs. $\times 3)$

$= (29\frac{3}{4} - 15\frac{3}{4})$ lbs.

$= 14$ lbs.,
$\therefore$ a girl eats $\frac{1}{5}$ lbs. per week.

$= \frac{2}{7}$ lb. per day. Ans.

4. G. ELDER.—How much water per gallon must I mix with whisky of 50 per cent. above proof to reduce it to 12 per cent. above proof, water being 100 below proof, and proof spirits being half water and half pure alcohol?

(*Capel's* 'Catch Questions.')

Water : Whisky :: 150 — 112 : 112.
:: 38 : 112,
:: 19 : 56,

$\therefore$ $\frac{19}{28}$ gal. of water must be mixed with each gallon of spirits. Ans.

Publications Received.

ALLEN, W. H., & Co.—Lessons on Health (*Dr. Newsholme*).

BELL, G., & SONS.—The English Language (*Adams*); Exam. Papers in Trigonometry (*Ward*).

BLACKIE & SON.—Dynamics and Hydrostatics (*Pinkerton*); Century Arithmetics, Standards VI. and VII.; Vere Foster's Drawing Book: Solid Geometry; Blackie's Modern Cyclopedia, Vol. VII. (*Dr. C. Annandale*).

CASSELL & Co., LIMITED.—Handbook of the New Code (*Moss*).

CHAMBERS, W. & R. (LIMITED).—Chambers's Expressive Primer, Parts 1 & 2.

CHAPMAN & HALL.—Elementary Art Teaching (*Taylor*).

CLIVE & Co.—Vergil, Æneid IX. (*Allcroft & Masom*); French Prose Reader (*Barlet & Masom*); Advanced French Reader (*Barlet & Masom*); History of England, 1485—1580 A.D. (*Fearenside & Low*). } University Correspondence College Tutorial Series.

CURWEN & SONS.—The Seven Sisters: A Cantata (*F. L. Bristow*); Windsor Songs (*Foxwell & Kinross*).

EDUCATIONAL SUPPLY ASSOCIATION, THE.—Certificates.

FISHER UNWIN, T.—The Story of the Nations: Switzerland (*Lina Hug and R. Stead*).

LONGMANS & Co.—Longmans' French Course, Part II. (*Bertenshaw*); Longmans' Handbook of English Literature, Part V. (*McWilliams*); Geometrical Drawing for Art Students (*Morris*); Elementary Science Manuals—Geology (*Bird*); Practical Plane and Solid Geometry (*Morris*); Elementary Algebra (*Potts & Sargunt*); A Student's History of England (*Gardiner*).

MACMILLAN & Co.—A Shilling Book of Arithmetic for Elementary Schools (*Lock*); Higher Arithmetic and Elementary Mensuration (*Goyen*); Southey's Life of Nelson (*Macmillan*).

NELSON, T., & SONS.—The Royal Story Book Readers: Stories from Fenimore Cooper's Tales, St. V.; Ivanhoe, St. VI.

NUTT, DAVID.—French Phrase Book (*Calais*).

PITMAN & SONS.—Pitman's 'Fono' Headline Shorthand Copybooks, No. 1.

THE LONDON EDUCATIONAL DEPÔT.—The All England Mental Arithmetic (*Ellery*).

WILLIAMS & NORGATE.—Grimm's Fairy Tales (*Hickie*); German Composition (*Ohly*).

VERE FOSTER'S NATIONAL COMPETITION IN WRITING, LETTERING, DRAWING, AND PAINTING.—Twentieth Annual Distribution of Prizes, 1890. The National Competition in Writing, Lettering, Drawing and Painting, instituted in the year 1870, is open to Pupils of either Public or Private Schools throughout the British Empire. Five thousand six hundred and forty-nine prizes have been already distributed, amounting to £2,597 17s. 6d., and the pupils of more than 4000 schools of all classes have taken part in the competition, which has extended to nearly every large town in the United Kingdom, and to Australia, New Zealand, Malta, and Rangoon.

The average quality of the work sent in is superior to that of any previous year.

During the past year there have been 552 Competitors in Ordinary Writing, 37 in Plain and Ornamental Lettering, 273 in Drawing, and 76 in Painting. 438 boys have competed, and 412 girls, representing 29 counties in Ireland and 44 in Great Britain.

We give the names of those who gained the highest prizes and congratulate them upon their success.

Writing, Original and Palmerston Series, W. K. Aikman, age 14, Edinburgh Collegiate School; Lizzie Farrelly, Cloonloo National School, Sligo. Bold Series, No. 7, Margaret Fleming, age 13, Lisgennon National School, Mayo; Agnes Fleming, age 17, Lisglennon National School, Mayo. Bold Series, Nos. 13 and 14, Annie K. Leddy, age 17, Millcastle National School, Westmeath; John M'Candless, Clifton Park National School, Belfast. Bold Series, Nos. 16 and 17, Annie K. Leddy, age 17, Millcastle National School, Westmeath; John Bones, Tuam P. L. U., Co. Galway. Bold Series, No. 18, Annie K. Leddy, age 17, Millcastle Westmeath; Patrick J. M'Kenna, Rathwyre, National School, Westmeath; Extra Prize, Ellie M. Leddy, age 18$\frac{3}{4}$.

Lettering, W. T. Heath, Noel Park, Wood Green, London; Beatrice A. Armstrong, Milton House School, Sunderland.

Drawing, A. B. C. D.—Elementary, Kate Fleming, Lisglennon National School, Co. Mayo. E. G.—Flowers, Margaret Fleming, Lisglennon National School, Co. Mayo. I.—Freehand Ornament, Margaret Fleming, Lisglennon National School, Co. Mayo. J. K. M.—Marine, William Thomas Heath, Wood Green, London. O.—Animals, W. Gebbie, Edinburgh Collegiate School. Q.—Human Figure, Agnes Fleming, Lisglennon National School, Co. Mayo. T.—Mechanical, Tom Gebbie, Edinburgh Collegiate School.

Painting, Simple Flowers, George H. Jenkins, Seaton Terrace, Plymouth. Advanced Flowers, Maud Emilie Newman, 40, Russell Square, London. Landscape in Sepia, Florence Reddie, 40, Russell Square, London. Simple Landscape and Animals, A. C. N. Newman, Burton Latimer Rectory, Northamptonshire. Advanced Landscape, Marine, Trees, and Illuminating, Richard A. Mill, Plymouth Gov. School of Art.

Poynter's South Kensington Drawing-Books, Freehand for Children, First Grade, Plants, Francis H. Jenkins, Seaton Terrace, Plymouth. Freehand, Second Grade, James Ballantine, Edinburgh Collegiate School. Elementary Human Figure, Beatrice Babb, Plymouth Gov. School of Art. Advanced Human Figure, G. F. L. Fisher, Cheltenham Place, Plymouth.

A similar Competition is invited for next year, for particulars of which see announcement at close of Prize List.

Short Studies in English Literature.

BY C. J. DAWSON, B.A.,

Former President of the N.U.T.

V.

Macaulay's Essay on Milton.

The length of Lord Macaulay's Essay on Milton forbids any attempt to enter into as much detail in our treatment of it as we did in former papers of this series with reference to Milton's minor poems. The remark may perhaps be allowed that the character and value of the essay would hardly warrant the same sort of exhaustive examination as may very properly be bestowed upon such condensed treasures of literature as *L'Allegro*, *Il Penseroso*, and *Lycidas*.

It is, however, far from being our wish to depreciate the remarkable piece of literary work which there is good reason to believe helped greatly to establish Macaulay's reputation as a brilliant and powerful writer, and to set the seal on his preference for the profession of letters. The Essay on Milton is not only brilliant, but it so abounds in the results of wide knowledge of literary and political history that it will amply repay attentive study.

But before studying the essay itself it may be well to note two or three facts respecting its appearance. The literary and historical essays on which Macaulay's fame was based were contributed to the *Edinburgh Review*, a periodical which had attained in the third decade of the century a high position of influence in the political and the literary world. The place of the Essay on Milton at the beginning of the collected edition of the author's essays rightly suggests that it was his first contribution to the *Edinburgh Review*. As Sir George Trevelyan, nephew and biographer of the historian, tells us, Jeffrey, the editor of the *Edinburgh*, anxious to maintain the reputation of his periodical, was seeking for new writers. 'Can you not,' he wrote to a friend in January, 1825, 'Can you not lay your hands on some clever young man who would write for us?' The result was that Macaulay's Essay on Milton appeared in the August number of the *Edinburgh Review*. To quote from Sir G. Trevelyan, 'the effect on the author's reputation was instantaneous: Like Lord Byron, he awoke one morning and found himself famous. The beauties of the work were such as all men could recognise, and its very faults pleased. The redundance of youthful enthusiasm, which he himself unsparingly condemns, . . . seemed graceful enough in the eyes of others, if it were only as a relief from the perverted ability of that elaborate libel on our great epic poet which goes by the name of Dr. Johnson's *Life of Milton*.' As likely to interest the student, two other facts may be quoted from Sir George Trevelyan's admirable biography. 'A warm admirer of Robert Hall, Macaulay heard with pride how the great preacher, then well-nigh worn out with that long disease, his life, was discovered lying on the floor, employed in learning by the aid of grammar and dictionary enough Italian to enable him to verify the parallel between Milton and Dante. But the compliment that of all others came most nearly home—the only commendation of his literary talent which even in the innermost domestic circle he was ever heard to repeat—was the sentence with which Jeffrey acknowledged the receipt of his manuscript: 'The more I think the less I can conceive where you picked up that style.'

The essay is doubtless valuable for its powerful correction of Johnson's 'clumsy ridicule;' but despite the fact that Macaulay declares of his own early work that it 'contains scarcely a paragraph such as his matured judgment approves,' and despite the justice of his opinion that it is 'overloaded with gaudy and ungraceful ornament,' it is probably no less valuable as a study of literary style.

In order to obtain the full benefit of a careful reading of this essay, the student would do well to analyse it in two or three different ways. First let him go through it, paragraph by paragraph, and note the divisions of the subject matter. Then let him note and classify the different forms in which the matter is presented; and lastly, let him examine the multitude of illustrations used to impress the argument on the mind of the reader.

The first paragraph, it will be seen, brings before us the occasion of the essay—the discovery in 1823 of a long-lost Latin manuscript of Milton's on the Doctrines of Christianity. The second expresses the writer's discriminating but favourable opinion of Mr. Sumner's translation, notes and preface. Paragraph three contains a careful criticism of the treatise as an example of Milton's Latin composition. Next we have, in three successive paragraphs, a general characterisation of the substance of the book, of its heterodox opinions, and of the slightness of its present influence. So far, all is preliminary. The seventh paragraph passes from the book to the writer, whose genius and virtues the essayist proposes, in all love and reverence, to commemorate.

The next paragraph claims a high position for Milton as a poet, and quotes with disfavour those who would detract from his genius on account of his circumstances. Then comes a declaration that his circumstances were unfavourable. The thesis 'as civilisation advances, poetry almost necessarily declines' is next stated, and argued in a series of seven or eight paragraphs, leading up to a conclusion that Milton as a poet triumphed over the greatest difficulties—those, namely, that originated in his learned education.

Next we have a paragraph on Milton's Latin verse and its relation to his greater works in English. Another disclaims any intention of making a complete examination of Milton's poetry. In three succeeding paragraphs he dwells on the characteristics of Milton's poetical works, the suggestiveness of his style, its magical influence. Particular poems, *L'Allegro* and *Il Penseroso*, are then adduced as exemplifying the characteristics mentioned.

Reference to *Comus* and *Samson Agonistes* introduces a description of the Greek drama, and the Ode, and then the Italian Masque. A further paragraph enters more fully into the construction and character of the masque of *Comus*, including some quotations. Brief reference is then made to *Paradise Regained*, and then the essayist enters upon the consideration of *Paradise Lost*, which he compares with Dante's *Divine Comedy*. Dante describes his imaginations in realistic fashion with exact details. Milton gives dim intimations, vague ideas. This comparison is continued

rather elaborately through two or three paragraphs, with additional illustrations from *Amadis of Gaul*, and *Gulliver's Travels*. The agency of supernatural beings as represented by Milton introduces a number of paragraphs on the relation of poetry to philosophy and religion. These include a comparison of the spirits of Milton with those of Dante, and also with the gods and demons of Aeschylus. Milton and Dante are then compared as to personal character, the first being distinguished by 'loftiness of thought,' the second by 'intensity of feeling.' The misfortunes of both in ambition and love are next depicted, and in Milton's case, especially, it is shown how he triumphed over all adverse influences. Two paragraphs in praise of the sonnets of Milton conclude the comments on his poetry, and bring us to the middle of the essay.

The remaining half is occupied with a discussion of Milton's public conduct. This we suggest that the student should analyse in a similar way to that we have adopted in the part which deals with the poems. Considerations of space have obliged us to make our analysis include little detail. It would be well for the student to be more minute and exact in his work of abridgment; and for purposes of revision he might adopt the plan of numbering the paragraphs throughout the essay. The value of such an analysis or summary of the composition will appear, first in the assistance it affords to the memory in retaining a vivid impression of the successive parts of the subject, and secondly in the force with which it will direct the attention to the features of Macaulay's style, and to the striking allusions with which it is so copiously embellished.

One feature that the student cannot fail to notice is the variety of form which characterises Macaulay's sentences. There is much art in this varied construction, and this is sometimes so little concealed as to become artificiality. The object of the word-artist is not simply to give pleasure, but to strike the attention of the reader, hence the use of so much variety. Of the sentence-forms employed, the three most noticeable are the periodic sentence, the balanced sentence, and the rapid succession of short sentences. We will select one or two examples of each kind, and suggest that the reader should carefully examine the essay in order to select other samples of each class.

The periodic sentence, let it first be remarked, is a sentence in which the principal statement is, by the use of modifying phrases and clauses, held in suspense, and remains incomplete until the very last word is reached. Here is an example from the part of the essay which exalts Milton's public conduct above that of the men with whom he was associated: 'He knew that those who, with the best intentions, overlooked these schemes of reform, and contented themselves with pulling down the king and imprisoning the malignants, acted like the heedless brothers in his own poem, who, in their eagerness to disperse the train of the sorcerer, neglected the means of liberating the captive.' The form of sentence which contrasts with this is called the loose sentence, and its characteristic is that it is grammatically complete before the end is reached, and the conclusion is added on as if it were an afterthought. The following may be called a loose sentence:—'And we shall scarcely be censured if, on this his festival, we be found lingering near his shrine, how worthless soever may be the offering which we bring to it.' The sentence might end at shrine, though an important element would be left out. If the last member of the sentence were placed first the sentence, though not altogether satisfactory, would have more of the compact structure of the period.

As examples of balanced sentences, note the following:—'Generalisation is necessary to the advancement of knowledge, but particularity is indispensable to the creations of the imagination. In proportion as men know more and think more, they look less at individuals and more at classes. They therefore make better theories and worse poems. They give us vague phrases instead of images, and personified qualities instead of men.' It is needless to select the words that balance one another in these sentences. The reader cannot help noticing them as he reads. But it is worth while to observe that this balancing of word against word gives rise to several rhetorical figures. When there is no obvious contrast, we have mere parallelism; with definite contrast, we have antithesis; with striking or extreme contrast, we have epigram and paradox. Here is another sentence illustrating balance and contrast: 'Then came those days, never to be recalled without a blush—the days of servitude without loyalty, sensuality without love, of dwarfish talents and gigantic vices, the paradise of cold hearts and narrow minds, the golden age of the coward, the bigot, and the slave.'

Here is an example of the succession of short sentences with which Macaulay relieves more sustained constructions:—'The Spirits of Milton are unlike those of almost all other writers. His Fiends, in particular, are wonderful creations. They are not metaphysical abstractions. They are not wicked men. They are not ugly beasts.'

We have perhaps dwelt sufficiently on this matter of sentence-forms; but the student may profitably pursue the subject, and make similar observations on other portions of literature. This essay of Macaulay's furnishes perhaps an excess of these rhetorical forms; for Macaulay was, above all, a rhetorician, and in his early work the obviously artificial arrangements of words for the sake of effect were most frequently employed.

Different from these devices, but in some degree allied to them, are such figures as Interrogation, Climax, Anti-climax; and of these many examples may be found in the Essay on Milton. The same may be said of the various figures of Comparison, Simile, Metaphor, Synecdoche, Metonomy. If the student will select examples of these figures, he will find the exercise not only interesting, but useful, inasmuch as it will help to impress on his memory the substance and characteristics of the essay. Mr. Alexander Mackie's edition treats the work for the special purpose of illustrating Rhetoric and Composition, and would probably be found very serviceable to the student.

Our third form of examination we must touch on but briefly. And this is perhaps the more excusable, as it is precisely the kind that is, as a rule, most thoroughly studied. We refer to the explanation of allusions. These, like the instances of figurative language, it would be well to classify. Let lists be made of the references to proper names under the heads literary, historical, mythological, geographical;

and let quotations direct and indirect be classified into those from Scripture, from ancient classics, from the Italian poets, from Shakespeare, from Milton, from other writers. A mere catalogue of the proper names will show how wide was the range of Macaulay's reading and knowledge, and our wonder at this wide range will be heightened when we find with what aptness and force the allusions are made. In the course of the essay the names are introduced of Homer, Herodotus, Pindar, Æschylus, Sophocles, Euripides, Plato, Theocritus, amongst Greeks; Virgil, Quintilian, Cicero, amongst Latin writers; Petrarch, Dante, Tasso, Guarini, Ariosto, Filicaja, amongst Italians; Spenser, Shakespeare, Massinger, Cowley, Denham, Dryden, Shaftesbury (the philosopher), Newton, Johnson, Mandeville, Clarendon, May, Goldsmith, Swift, Gibbon, Hume, Burke, Boswell, Byron, and others amongst English writers. Of separate works directly referred to or quoted from, we find, besides Milton's own works, Shakespeare's *Hamlet*, *Lear*, *Othello*, *A Midsummer Night's Dream*, *The Merchant of Venice*, Homer's *Iliad* and *Odyssey*, Virgil's *Æneid*, Massinger's *Virgin Martyr*, Johnson's *Lives of the Poets*, Goldsmith's *Abridgment of English History*, Mandeville's *Fable of the Bees*, Spenser's *Faerie Queen*, Ariosto's *Orlando Furioso*, Tasso's *Aminta*, Fletcher's *Faithful Shepherdess*, and a large number of historical works.

The student should, as far as time and opportunity will allow, find out something respecting each of the persons mentioned, and each of the works referred to; but the wondrous wealth of illustration does not a little to defeat its proper object of throwing light on the subject of the essay, by dazzling the mental vision, and, indeed, distracting it, as it would be by looking through a glass with many facets.

The essayist seems sometimes so to revel in his illustrations, his allusions, and parallels, as to obscure the argument which he so needlessly over-labours. There is an explanation of this exuberance in Macaulay's omnivorous appetite for reading, and in the marvellous retentiveness of his memory. His reading supplied him with a never-failing succession of illustrations, and his memory brought them with almost unerring certainty from the remotest sources to places where they would fit well into his compositions.

The allusions are, however, not only rather too numerous, and sometimes too remote for the reader readily to follow them, but they often involve an excess of the superlative. It would be easy to find many examples in the essay of what its author condemns as *Boswellism*, what he elsewhere, in his essay on *The Earl of Chatham*, calls the Lues Boswelliana, or disease of admiration. But after all deductions are made for over-ornamentation, for extravagant admiration, for excess of artificial construction, the essay remains a remarkable piece of literary workmanship, well worth the pains of careful study, and likely to leave with the student not only pleasant recollections but permanent advantages.

(To be continued.)

Publications Reviewed.

Royal Story-Book Readers. Standards I.—IV. London: T. Nelson and Sons.

We have received the first four books of this new series of Readers, suitable for the first four Standards. The first is named 'Stories and Fables;' No. 2 contains Stories of Children's Pets; Hans Andersen's Story Book is the third; and the fourth is the story of the Swiss Family Robinson.

Everything that long experience and great resources could supply has been used to make the books attractive. They are strongly and neatly bound, the type is large, the illustrations select and numerous, while the matter of the third and fourth numbers is known by every reader to be interesting and fascinating to children. Nos. 1 and 2 have evidently been written by persons who know both the capabilities and the requirements of little children. Of the multiplicity of reading books from which teachers can select, we know of none to excel and few to equal the Royal Story-book Readers. We should add that they fulfil all the English and spelling requirements of the Code, in addition to their suitability as Readers.

Scholarship Questions, with Hints and Solutions, 1887—9. London: National Society's Depository.

This is a reprint of three years' Scholarship Questions in an octavo volume of some ninety-six pages. The mathematical questions are answered pretty fully, only one or two questions relating to reasons and processes being omitted. This, however, is a rather serious omission in our opinion, as however readily they may be found in a text book they cannot too frequently be brought under the notice of candidates. In the grammar hints, analysis and parsing are done fully in every case, but the paraphrasing, which is considered so important, is not done for any year. This also we regard as a serious omission in a volume which professes to give answers to the grammar questions. No exercise is generally so badly performed by pupil teachers or candidates for scholarship. A correct paraphrase of one of the examples, 'There is in souls a sympathy with sounds,' &c. would probably have been the means of preventing in future the repetition of the stupid attempts as shown in the latest blue book. The book is well printed and will serve a useful purpose to intending scholarship candidates.

Elementary Arithmetic. C. Pendlebury, M.A. London: George Bell and Sons.

We learn from the preface that this book is essentially one for beginners, and is intended to serve as an introduction to the *Arithmetic for Schools*, by the same author. We have looked through the book carefully without being quite able to find whether it is intended for the teacher or the pupil. More than two pages are devoted to teaching the addition table. Surely children who have not learned to add together 2 + 3 + 7 would not have an arithmetic put into their hands. Nothing, it is true, is more important than the ability to add; but, as every teacher knows, it is not acquired in a day, least of all from a book. When we come to multiplication we find it defined as a 'Short way of finding the sum of any number of given equal numbers.' 'The number of given equal numbers is called the multiplier.' Is this an easy, neat, and accurate way of putting a simple matter? And why should a beginner in arithmetic be expected to write down from dictation 304070800? We consider that the author has failed to see what it would be best to teach as well as what would be the best way of presenting it.

Higher Arithmetic and Elementary Mensuration. By P. Goyen, F.L.S. Second Edition. London: Macmillan and Co.

Of the material characteristics of this work it is sufficient praise to say that as regards size and prominence of type, paper and general turn-out, it is equal to many others published by the same firm. We have not been able to discover any printer's errors or incorrect answers. This is the second edition, and the opportunity has been utilised to provide valuable chapters upon approximate calculations, the progressions, and scales of notation. One hundred additional miscellaneous examples—most of them of considerable difficulty—have been inserted.

In view of the tendency of higher arithmetic to encroach upon the province of Algebra, even in papers for females (see recent Certificate Questions), this extension is certainly well-advised.

To many students it is also a decided advantage to have contained between the same covers the elements both of Arithmetic and Mensuration.

We quite agree with the author in his low estimate of the unitary method, and he is especially to be congratulated upon his employment of the equative method, his proofs of operations, the general graduation and arrangement, and the discernment displayed in the selection of the unusually numerous fully worked-out examples.

A little obscurity has slipped in on p. 271, where the areas of similar figures are said to vary as the square[s] of their like dimensions. But the term *dimension* has not been explained, and popularly it is supposed to include the word *area*, especially in giving the data for calculating solid content. A similar remark applies to sentences on p. 287.

There are omissions in circulating decimals of various useful theorems—in brackets, of the vinculum (neither is this spoken of under vulgar fractions)—and in reciprocals, of the statement of the rule.

In illustrating fractional operations would it not have been better to have restricted the *line* for Addition and Subtraction, and to have employed the *rectangle* for Multiplication and Division?

Mensuration should have been introduced by a few remarks on dimensions (see above), and by an explanation of the derivation of square and cubic measure from long measure.

The circle is not said to be a polygon having an infinite number of sides, although in the solid section it is so considered.

There is no chapter upon clock problems.

However, most of these are mere points, and the volume as a whole can be highly recommended both for general educational, technical and examinational purposes.

Handbook of the New Code. 1890. By John F. Moss, Clerk of the Sheffield School Board. London: Cassell & Company.

Teachers and managers of elementary schools will find this handbook a full and trustworthy guide to the understanding of the new education code and the subsidiary documents issued from the Education Department. In a volume of convenient size we have not only well-printed copies of the code, the instructions to inspectors, and all important official circulars bearing upon the regulation of elementary schools under Government inspection, but very copious notes inserted in smaller type in the body of the text to throw light upon all points where difficulties of interpretation might occur. It is well to have such notes, based as most of these are upon authoritative information, and brought up to date, in close proximity to the text they elucidate. At the same time a rather more definite plan of distinguishing notes from text would perhaps be preferable.

Adams' Elements of the English Language. Twenty-fourth Edition. Revised by J. F. Davis, M.A., Litt. D. London: George Bell and Son.

Every one has his pet notions about Grammar. Nevertheless we always approach the consideration of any manual upon this subject with the idea that any given theory or explanation is not to be condemned even if it disagree with our preconceived ideas, provided always that it is not contrary to historical facts, and is logically consistent.

The work before us—the revised and twenty-fourth edition of an old friend—may be implicitly trusted as far as the historical facts are concerned, but is in some instances not so reliable as to the deductions drawn therefrom, nor as to the agreement of one part of the book with another.

These defects are partly owing to the two minds at work, which have somewhat marred the consistency of the volume, the author and reviser not having always thought alike nor adopted the same plan.

Thus we are told (p. 95) that there are three cases in English, but in the Syntax five are considered.

On p. 114, *my*, *thy*, etc., are classed as possessive adjectives, whereas on pp. 130, 132, they figure as the possessive cases of personal pronouns.

Some of the remarks are, moreover, too positive in dealing with unsettled questions. The mimetic theory of the origin of language is too highly spoken of, especially when we consider that imitative words are almost always barren.

Neither is the declaration on p. 64 universally agreed to, viz., 'that changes of vowels are even more important than changes of consonants.'

Other statements are positively incorrect, defective or debatable, *e.g.*,

(*a*) The pronoun is a 'simple' noun, p. 77.

(*b*) 'The dative is now expressed by a preposition followed by the objective case,' p. 95.

(*c*) Verb is the grammatical term for action, p. 148.

(*d*) Conjunctions do not connect words, p. 213.

Of statement (*a*) we may remark that the fundamental distinction between symbolic and presentive words does not seem to have been regarded.

In a few instances the matter is not well balanced, only seven pages being given to Analysis, whilst 24 are devoted to the classification of languages.

On p. 203 we find, as instances of prepositions used after nouns, the words *here-with*, *there-by*, etc.

There is tóo much crowding on pp. 44 and 45, and Greek characters seem sometimes to be used for Greek words (p. 63), and sometimes nôt (p. 90).

We are glad to find that certain prepositions are allowed to govern sentences instead of being classed as conjunctions, and that Verner's law finds a place.

Summing-up, we can testify that the edition is thoroughly sound at heart, possesses the high quality of exciting thought into action, and with a little more attention to accurate detail will maintain the high place already secured by former editions. No school library is complete without it.

The Century Arithmetic. Standards VI. and VII. London: Blackie and Son.

For Standard VI. this is a capital book of examples, forty-four pages being devoted to it. Each class of example is preceded by a worked-out sum, but no verbal explanation is given.

The contents of the part devoted to Standard VII. do not correspond with the requirements as printed on the back of the book. The Mental Arithmetic Examples and the Examinaton Tests are suitable, and carefully selected.

The Newspaper World. By Alfred Baker. London: Isaac Pitman and Sons, 1, Amen Corner.

The granting of a charter of incorporation to the Institute of Journalists has increased the interest which the general reader feels in matters relating to the press. Mr. Baker has taken advantage of this fact to present in a series of twenty short essays, a concise history of British Journalism, and to relate its triumphs over repressive legislation and fiscal duties, and at the same time to give an account of the various individuals upon whom we are dependent for our daily broadsheet. To those unacquainted with the multitudinous class constantly employed, the little booklet will prove highly instructive and serviceable, and we can cordially recommend it to those who have not leisure or inclination for reading any larger work on the same subject.

Book-keeping. By David Tolmie, F.S.Sc. London: Isaac Pitman and Sons.

This is a short treatise on book-keeping, intended for self-tuition, although it may be used with advantage for class purposes. The explanations given are clear and concise; rules are given for the various processes; examples of day-book transactions together with correct journalising are given; bill and banking transactions and the various items of profit and loss are fully dealt with, and the book closes with 36 pages of 'a month's transactions,' which are entered into the various books of the firm to which they relate. The pupil has thus a model set for him, and diligent attention to the explanations previously given will enable him to understand the reason for the various entries. The book is one which can, perhaps, be better placed in the hands of adults than those of children in elementary schools.

School Examination Series: Examination Papers on Trigonometry. By G. H. Ward, M.A. London: George Bell and Son, and Methuen and Co.

This is a work issued especially for such schools as Eton and Harrow, but it is also well suited for the Upper Forms of any high-class school, and for candidates for such examinations as the University Locals, and the Science and Art Department Pure Mathematics, Stages II. and III.

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We are afraid, however, that the absence of answers will militate against the sale of the book, as the price of the Key (which we have not seen) reaches five shillings.

Vere Foster's Drawing-Book: R 4. Solid Geometry. London: Blackie and Son.

Mr. Vere Foster and the publishers are doing their utmost to bring this new edition of a very popular series of drawing-books thoroughly up to date. This number is full of instructions, illustrations and exercises for practice in solid geometry. The definitions are clear and easy to understand, while the questions to be answered are suitable and select. It will fulfil all the requirements of the examination in drawing in solid geometry for Stage VI.

Illuminated Certificates. London: Education Supply Association, Holborn Viaduct, E.C.

This well-known firm has just issued four new illuminated certificates for children passing the Examination by Her Majesty's Inspector. They are printed in gilt and various colours, the borders being of floral or ornamental design, and the whole appearance—especially that of No. 231—striking and effective.

Each design is published in three sizes, and we can recommend the whole to teachers seeking something new.

Southey's Life of Nelson. By Michael Macmillan, B.A. London: Macmillan and Co.

The editor of this work seems to have gone to his work *con amore*. The introduction to one of the most inspiriting biographies in our language is written with great discrimination and care; while the notes, which occupy nearly a hundred pages of the volume, are so full that the merest tyro should be able to read the book with ease and comfort. It is a book well suited to place in the hands of the elder boys in school; and if this is the purpose intended by the editor, the youngest pupil teacher, by the aid of the notes, would be able to conduct the class using the book.

The Merchant of Venice. By K. Deighton. London: Macmillan and Co.

This edition contains the text of the play, an introduction of twenty pages, and notes covering ninety pages. The introduction is a good summary of the play, and the notes are precise, clear, and, we need hardly add, full. A student who has mastered the contents of this volume will have a thorough acquaintance with the play, and be prepared for any test of his knowledge of it to which he may have to be subjected.

Primer of Book-keeping. By J. Thornton. London: Macmillan and Co.

The publishers' primers of various kinds are noted for their excellence and for their suitability for the purpose intended. This primer of book-keeping is not a whit behind any of its predecessors. It is written mostly in the first person singular, and has almost the value of *viva voce* lessons. Its purpose is to enable pupils to understand the principles of book-keeping. The method adopted in the book is analytic instead of synthetic. The balance sheet is to the writer the most important part of keeping accounts, and so, instead of troubling about a day book and invoice book, the pupil is at once introduced to the ledger, the method of keeping, and especially the method of proving, it. By the elision of shillings and pence the accounts are simplified, and the working out of the exercises in various forms compels the attention to the principles underlying what is done, instead of to the mode of working. As every child who leaves school ought to know something of accounts, a book of theory and practice is needed, and we have not yet met with a little book which will serve the purpose better than this shilling primer.

London Intermediate and Preliminary Scientific Directory. London: W. B. Clive & Co.

This is an introduction to the Preliminary Scientific and Intermediate Science Examinations, similar to those already published for the matriculation and arts. It is on the same lines giving valuable and detailed information respecting the books to be read and the steps to be taken. It also contains the Examination Papers set in July, 1890, together with model answers. It ought to prove a useful guide to those intending to read for a science degree.

Intermediate Art Directory. No. 3. July, 1890. London: W. B. Clive & Co.

This is a new edition of what has now come to be a well-known guide to the Inter. Arts Examination. It contains the questions set at the last Examination in July, 1890, together with the answers to them. We have no doubt that this guide will be as useful and as favourably received as former editions of the same work.

An Elementary Text Book on Dynamics and Hydrostatics. By R. H. Pinkerton, B.A. Second Edition. London: Blackie & Son.

We took occasion on the first appearance of this book to speak very favourably of it in these columns. This second edition the author tells us has been carefully revised, and some errors which appeared in the first edition have been corrected. An appendix has been added, giving the method of co-ordinance, a discussion of simple harmonic motion, and a method of finding moments of inertia. There are also additional Examination papers and useful sets of tables. We can only refer to our former commendation, and the way in which both author and publisher have done their work, and repeat the hope that such a useful and reliable text-book may have a very wide circulation.

Recitations, Rhymes and Dialogues for Kindergarten Schools. Compiled by E. Warington. London: G. Philip & Son.

As good a collection as any we know. We tried a dozen of them on a lively little thing of five years old, and every time we attempted to stop she asked for more. We think that a good test of the suitability of the book for the purpose.

Excelsior School Maps. London: G. W. Bacon and Co.

The examples now before us of this excellent series are the following—map of England and Wales, map of British Isles (reduced edition,) map of India, and a test map of Western Europe. Messrs. Bacon and Co. are to be congratulated as much for the originality displayed in the features which distinguish these maps from those in ordinary use in schools, as for the successful and practical way in which they have carried out their conceptions. By the adoption of four distinct colour printings—blue, black, red, and brown—for the outlines, names, town-spots, and hills, the advantages of contrast have been secured, and a clearness produced which enables the physical and political features to be studied without confusion, and renders the maps especially adapted for class use. We have no hesitation in heartily commending the 'Excelsior' series of maps.

Christ Blessing little Children. Engraving by James H. Watt, from a painting by Sir Charles Eastlake. London: G. W. Bacon and Co.

This picture by Sir Charles Eastlake is, perhaps, sufficiently well known to render detailed description unnecessary. It will suffice to say that the engraving is a very creditable production, and we should be very glad to see others of similar excellence on our walls, bearing the names of British engravers and British firms, and illustrating not only religious subjects but episodes from our national history; for that would imply that some attempt, at any rate, was being made to stem the tide of trashy continental productions which at present inundate the land.

Owing to pressure on our space we are obliged to hold over until next issue Contracted Arithmetic; How a Scotch School was Examined; and An Elementary Course in the use of Wood Working Tools.

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